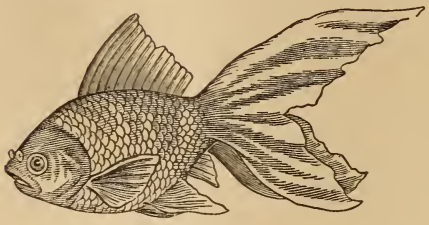
THE NEW YORK AQUARIUM

Wm. Stoffregn,

124 & 126 Fourth Avenue,

Between 12th and 13th Streets. NEW YORK.



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TEMPORARY GUIDE

TO THE

NEW YORK AQUARIUM

PREPARED BY

L. B. SPENCER

OF THE AQUARIUM STAFF

PREFATORY NOTE.

Upon the transfer of the New York Aquarium from the Department of Parks to the New York Zoölogical Society, the preparation of a new catalogue was commenced.

The completion of this catalogue having been delayed, the present edition of the guide to the Aquarium, prepared in 1898 by Mr. L. B. Spencer, has been authorized for temporary use.

C. H. TOWNSEND,
Director.

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PREFACE.

This guidebook contains a brief description of nearly all the exhibits that now are or have been in the New York Aquarium. The use of technical terms has been intentionally avoided, so that the descriptions might be the more easily understood by the general reader.

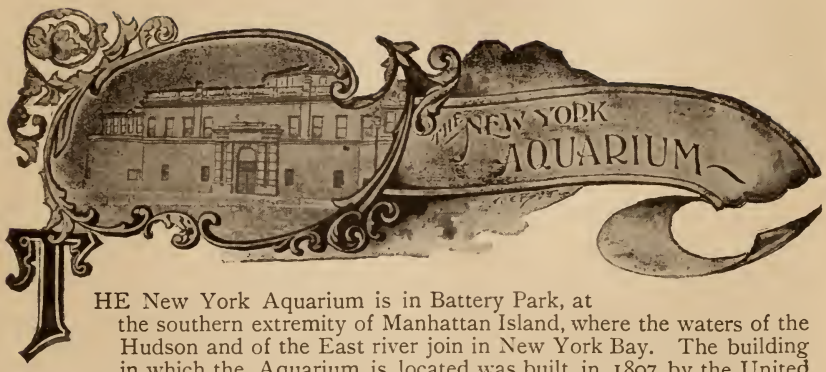
The species of fishes are arranged in the same general order as they are found in "A Check-list of the Fishes and Fish-like Vertebrates of North and Middle America," by David Starr Jordan and Barton Warren Evermann. The technical names, with but few exceptions, are the same as those found in that work, from which also much valuable information has been derived. I am under obligations to Mr. Wilbur K. Parmelee for his aid in identifying several species of the turtles. The technical names of the Invertebrates are with but few exceptions identical with those given in "Invertebrate Animals of Vineyard Sound," by Professor A. E. Verrill. The illustrations, from which the plates of single fishes were made, were furnished by the United States fish Commission.

L. B. SPENCER.

New York Aquarium,
December, 1898.

SPECIAL NOTICE.

The various species contained in the tanks, are numbercd on the left of the name labels, to correspond with the numbers in the Guide.



THE New York Aquarium is in Battery Park, at the southern extremity of Manhattan Island, where the waters of the Hudson and of the East river join in New York Bay. The building in which the Aquarium is located was built in 1807 by the United States government as a fort. It was originally known as the southwest battery, and it stood upon rocks and made ground a hundred yards distant from the shore, with which it was connected by means of a drawbridge. In the course of time the shoreline was carried out with the result of bringing the old fort within the boundaries of the Park, as it stands to-day.

After the war of 1812 the southwest battery was called Castle Clinton. In 1822 the United States ceded Castle Clinton to the City of New York; and in 1824 the city leased it to private persons who turned it into a place of amusement. Hereafter it was known as Castle Garden, and under that name it became famous. It would seat 6,000 persons, and 10,000 could find room in it. It was at one time and another variously arranged and adorned according to the use to which it was put, and this included a great variety of purposes. A summer garden, an opera house, a theatre, a concert hall, an arena for equestrian performances and a place for the reception of distinguished visitors, are some of the phases of its use.

Jenny Lind sung in Castle Garden upon her arrival in this country in 1850, and again before her departure in 1852. Lafayette was received here on his visit to this country in 1824. President Jackson was received here in 1832; President Tyler in 1843, and Louis Kossuth in 1851.

In 1855, Castle Garden ceased to be used for amusement purposes. The population of the city, which, in its earlier history, had been settled chiefly in the lower part of the Island, had now moved farther northward and sought other places of amusement. In that year the building was bound over to the Commissioners of Immigration as a place for the reception of immigrants. It was used for that purpose until 1891, in which year the landing station for immigrants was transferred to Ellis Island.

Castle Garden was then devoted to its present use. The Aquarium was completed and opened December 10, 1896. Its visitors during the first year numbered 1,635,252.

The Aquarium contains seven large pools, ninety-four wall tanks, four turtle tanks, and a considerable number of smaller glass tanks, these being all for ex-

hibition purposes. It has also a large number of tanks for reserved stock and other aquarium uses. The pools are on the floor of the Aquarium. The great central pool is circular in form, thirty-eight feet in diameter and six feet in depth, is surrounded by six other pools, which are oblong in shape, each twenty-eight feet in length and three feet in depth. The wall tanks are in tiers, a ground floor and a gallery tier. They vary in width from three feet to seven and a half feet, the smaller tanks being on the gallery tier. All are about four feet in depth. On the ground floor tier some of the tanks are joined in couples, making practically single tanks ten feet in length. The turtle tanks, which are shallow, are placed by themselves on the gallery floor of the building, opposite the entrance.

The reserve tanks, with those used for hospital purposes, and those used for the keeping of small fishes and shrimps, for live food for the larger fishes, are in a wide corridor back of the wall tank, and between them and the outer wall of the building. The fishes in the wall tanks are fed and otherwise cared for from the corridor, and the tanks are cleaned and looked after from here. Here also are the various lines of pipes that are required for the supply and efficient operation of the tanks.

The pools on the floor of the Aquarium are all supplied with salt water. The wall tanks on the north side of the building are for fresh water fishes, those on the south side of the building are for salt water fishes. The pools and the wall tanks are circulating; that is, the water in them is kept sweet by circulation. There is in each a constant inflow of water, the surplus being carried off through an overflow pipe. The salt water used at the Aquarium is taken from wells sunk under the building. The made ground through which it is drawn serves as a great natural filter, and it is pumped, without the need of further filtering, directly into the supply tanks, whence it is pumped to the other tanks. The fresh water supply is taken from the city's water supply. The fresh water is filtered before using.

All fishes require air for their existence, there is air in all living water. In circulating aquarium tanks the air is being constantly renewed with the inflow of water. If the air in the water is not sufficient for the fishes in a tank more may be added to it in various ways. There is here provided compressed air, which is carried to the tanks in pipes with a separate opening at each tank. In nature fishes seek colder or warmer waters at greater or lesser depths or by moving into other latitudes. Here the temperature of the water in some of the tanks may be changed by artificial means. There is a refrigerating plant for cooling fresh water. This plant supplies water for the tanks of such fishes including trout, as require in summer water cooler than obtainable from the ordinary source of supply. Trout would almost certainly die if it were sought to keep them here through the summer in water of the high temperature at which it comes from the city pipes. In nature, at this season, they would seek cool and shady pools. With the refrigerating apparatus it is possible to keep the water in the tanks at any desired temperature. The tropical and sub-tropical fishes would as certainly die here on the approach of winter in the water of these latitudes. The salt water pumped from the Aquarium's wells is about five degrees cooler in summer, and about five degrees warmer in winter than that of the bay. It is not nearly warm enough in winter, for the fishes from Southern waters. For their preservation through that season a hot water plant is installed by means of which sea water is heated and supplied to their tanks at whatever temperature may be required.

The boilers, supply tanks, filters, and other appliances of the operating plant

are on the western, or seaward side of the Aquarium. On the park side of the building over the entrance, are the offices of the Aquarium, and rooms for laboratory purposes. Here are kept the beginnings of a museum collection, and here, also, are most of the balanced, or self-sustaining tanks.

The total number of visitors for 1898 was 1,689,471, a daily average of about 5,000. August 20th (the day of the Naval Parade), was the record day for the year, when 47,360 people passed through the doors. During the year 1897 the number of visitors was 1,635,252, 54,219 less than in 1898, the largest number in one day being 21 000, during the time the white whales were being exhibited. During 1899 the visitors were 1,841,330, exceeding 1898 by 171,245; the largest attendance for one day was 37,248, "Dewey Day." The attendance for 1900 was 1,585,584, for 1901 1,644,856.

The Aquarium is open daily, free, from 10 A. M. to 4 P. M.

These Bronze Tablets were placed in the building during 1898:

This building was transformed into an aquarium by the Department of Public Parks during the administration of

THOMAS F. GILROY, MAYOR OF THE CITY OF NEW YORK, 1893.

ABRAHAM B. TAPPEN, President.
GEORGE C. CLAUSEN, Vice-Prest.
NATHAN STRAUS, Commissioner.
PAUL DANA, Commissioner.
CHARLES DE FOREST BURNS, Secretary.

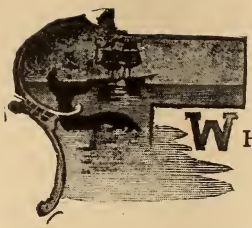
This building was opened to the public as an aquarium by the Department of Public Parks, in the year 1896, during the administration of

WILLIAM L. STRONG, MAYOR OF THE CITY OF NEW YORK.

SAMUEL MCMILLAN, President.
S. V. R. CRUGER, Vice-President.
WILLIAM A. STILES, Treasurer.
SMITH ELY, Commissioner.
WILLIAM LEARY, Secretary.

The above is an illustration of an old fashioned plaque representing Fort Clinton, (now the Aquarium), presented to the N. Y. Aquarium October 29th, 1896, by Mary D. Earle, Alida van Derwerken Earle and Rosalie V. Earle of New York.

MAMMALS



1. The Beluga, or White Whale. *Delphinapterus catodon* (Linnæus).

WHITE WHALES are quite numerous in the North Atlantic, North Pacific and Arctic Oceans. Dr. G. Brown Goode writing in 1884 of White Whales, says, "They abound in the Behring and Okhotsk Seas, and ascend the Yukon River, Alaska, to a distance of seven hundred miles."

The White Whale reaches a length of fifteen to twenty-two feet. The young whale is lead colored. At various stages of its growth the outer skin, or epidermis comes off, sometimes in large patches making the surface look rough and mottled, the skin being much lighter in color after each shedding, or moulting, the color of the adult whale is cream white. The body of the White Whale is symmetrical and rather slim. It is a powerful swimmer, the head and mouth are small, as are also the fins, with the exception of the caudal fin or tail which is quite large, and placed horizontally, or crosswise of the body, instead of vertically and in line with the body as is the case with fishes, enabling the whale to rise quickly to the surface to breathe, and helping it also to dive.

The blow-hole of the White Whale, which is at the top of the head has a valve at its outer opening, when the whale rising to expel the vitiated air from its lungs, reaches the surface of the water, the valve rises. The whale expels the air quickly and with force sufficient to produce a sound that may be heard for some little distance. If the top of the head is not entirely clear of the surface. the expulsion of air raises a jet of spray a foot or two high. Having taken in a fresh supply of air the whale closes the valve and dives at once. It comes to the surface frequently but at irregular intervals.

Two specimens of the White Whale that were procured for the Aquarium at one of the fisheries on the Saint Lawrence River were placed in the large center pool on the morning of June 5, 1897. The larger of them, a female which was of cream color and about ten feet in length, was injured in transportation and lived only five days. The smaller one, which lived until July 25, 1897, a male, was of a light lead color, and measured nine feet in length, this whale was moulting when it was received at the Aquarium, soon after it was placed in the pool large fragments of its outer skin were found in the water. In a brief time the shedding process was complete, and the whale was then much lighter in color than before.

Living eels were supplied as food and the whale spent a large part of its time chasing, and catching them. It swam around the pool in the same direction as the hands of a watch, and always in that direction, never turning backward.

2. West Indian Seal. *Monachus tropicalis* (Gray).

HIS species of seal is rare, and but little has been written concerning its history and habits. The Triangles on which the West Indian Seals are found are situated off the coast of Yucatan in West Longitude 92° 10′ and North Latitude 21°. The Spaniards finding seals there in 1504 killed all in sight. It was believed at one time that these seals had been exterminated, or nearly so; but in January 1897 a herd of about thirty was found at the Triangles. The seals were sunning themselves on the rocks, and they were so tame that unless they were touched, they took no notice of the presence of men. Some of the male seals of this herd weighed eight hundred pounds.

The West Indian Seals at the Aquarium were received June 17, 1897. They show remarkable intelligence.

3. The Harbor Seal. *Phoca vitulina* (Linné).

The habitat of this species of seal is very extended; it is found in the waters of the Atlantic along this coast from New Jersey, to Greenland, and on the European coast from Spain to the British Islands; along the Pacific coast of this continent it is found from Santa Barbara to Alaska.

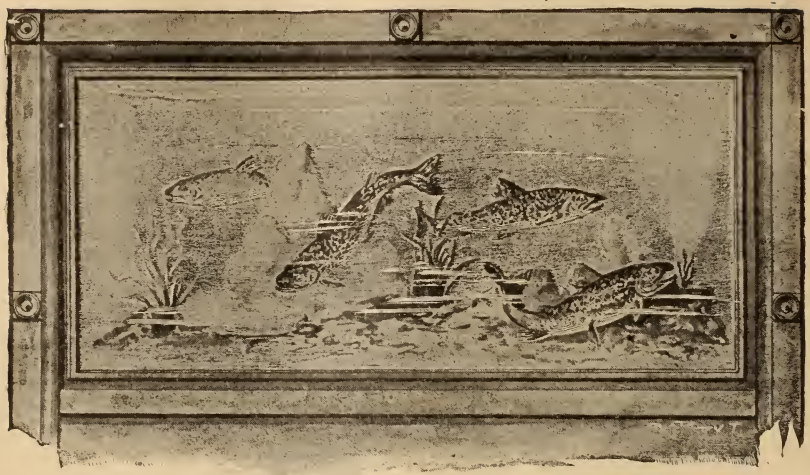
Most of the specimens exhibited hereabouts are taken on the coast of Maine and New Hampshire. The Harbor Seal is said to annoy the salmon fishermen in some waters by taking the fish from their nets; the seal being fond of salmon. Dr. De Kay, writing in 1842, states that the "common seal, or Sea Dog is now comparatively rare in our [New York] waters though formerly very abundant." He adds: "A certain reef of rocks in the Harbor of New York is called Robins' Reef from the numerous seals which were accustomed to resort there; *robin* or *robyn* being the name in Dutch for Seal."

When the seal dives, it closes its nostrils and ears.

The Harbor Seal on exhibition in the Aquarium, while sleeping during the day, lies on the bottom of the pool, coming to the surface for a fresh supply of air at intervals of fifteen or twenty minutes.

At night it sleeps on the stone platform at one end of the pool.

Its front flippers are used by the seal in moving itself about on land, and in climbing rocks, as well as in swimming; with its large and powerful hind flippers the seal propels itself through the water at great speed. The Harbor Seal reaches a length of four to six feet.



SPECIMEN TANK OF FISH. (TROUT.)

FISHES

4. Lamprey. *Petromyzon marinus* (Linnæus).

When the Lamprey's mouth is closed its snout somewhat resembles that of the eel; its open mouth, within which appear numerous concentric rows of teeth, serves as a sucking disk, by means of which it attaches itself to larger fishes, using its teeth to tear the flesh, and then sucking the blood. In the Aquarium, they are often seen attached to the side of the tank, or to the glass. Lampreys are found on the Atlantic coast of North America and Europe.

5. Smooth Dogfish. *Mustelus canis* (Mitchill).

Is common in the waters of this coast, West Indies, and Southern Europe. Slender in form, light gray in color, the underside nearly white. Its skin is smoother than that of any other species of shark, whence its name.

6. Sand Shark. *Carcharias littoralis* (Mitchill).

This Shark, which reaches a length of six to ten feet, and is very voracious, has sharp, irregular teeth, which curve inward. It is common on this coast. It feeds upon squids, and crabs and other crustaceans. Individuals of this species have lived in the pools of the Aquarium five months.

7. Horned Dogfish. *Squalus acanthias* (Linnæus).

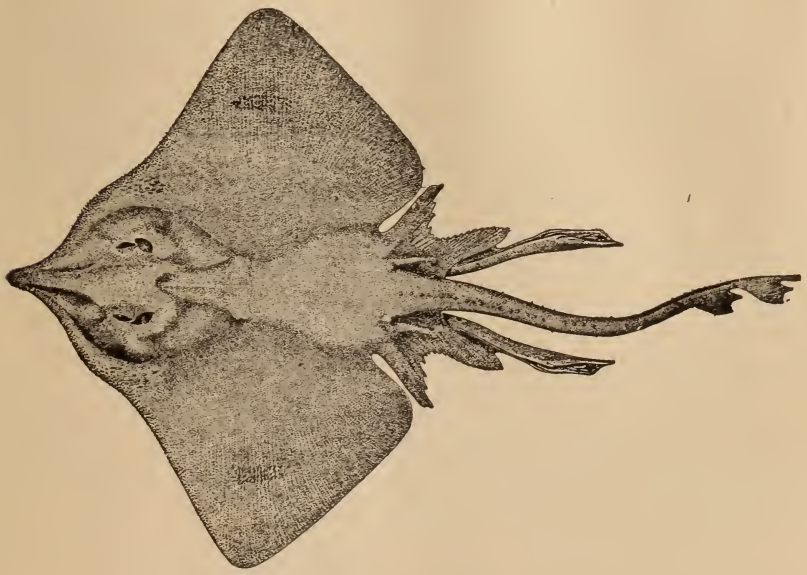
The skin of this species, when properly prepared is often used by fishermen for polishing metal, and for smoothing woodwork. Oil is obtained from the liver. It feeds upon herring, and grows to a length of three feet.

8. Common Skate. *Raia erinacea* (Mitchill).

This species is common on our coast, and found from Maine to Virginia. The color is light brown, with small spots of dark brown. This Skate has pointed groups of spines on portions of the upper surface of the body, whence the name Prickly Ray, by which it is also known. The snout and pectorals are blunt or rounded.

9. Barndoor Skate. *Raia lævis* (Mitchill).

The Barndoor Skate reaches a length of four feet. Its snout is much extended and quite sharp. The fleshy parts of the wing like pectoral fins are



used in some localities for food. It is said that fishermen on the New Hampshire coast salt for use as food portions of the body of the Barndoor Skate.

10. Common Sting Ray. *Dasyatis centura* (Mitchill).

This species attains a very large size, its disk in some cases measuring five or six feet across. Wounds made by the tail are painful, difficult to heal, and are often dangerous. Maine to Florida.

11. Common Sturgeon. *Acipenser sturio* (Linnæus).

It reaches a length of twelve feet, and a weight of six hundred pounds. The body is armed with five rows of bony plates. The snout of the young Sturgeon is quite sharp, but in the adult blunt.

The specimen in the Aquarium which was caught in the Delaware River near its mouth, was placed in the pool May 20, 1897. This Sturgeon is about

eight feet in length. It feeds regularly, which is not often the case with so large a fish of this species in captivity.

Atlantic Coast, and ascends many of the larger rivers.

12. Short-Nosed Sturgeon. *Acipenser brevirostris* (Le Sueur).

This Sturgeon is not plentiful in this vicinity; it does not grow large; it is hardy in captivity. The specimen on exhibition was caught in Gravesend Bay, and brought to the Aquarium May 14, 1896.

13. Long-Nosed Gar. *Lepisosteus osseus* (Linnæus).

One of the common names in use for this species is Billfish from its long slim snout. The vertical fins, and posterior portions of the body, are marked with round black spots. It is found in the Great Lakes and larger streams from Vermont to Mexico.

14. Mudfish; Bowfin. *Amia calva* (Linnæus).

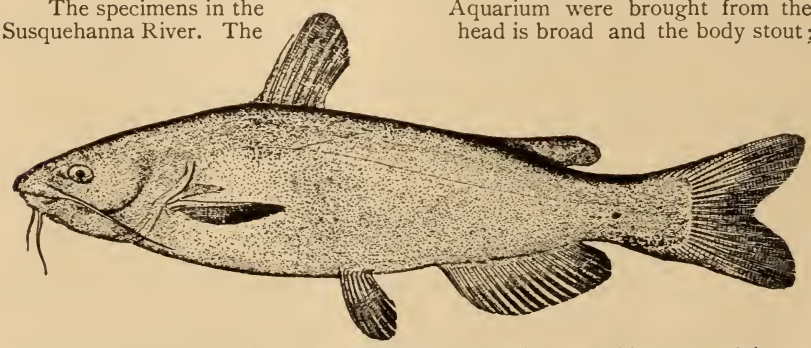
It occurs in the Great Lakes, and the sluggish waters of the Mississippi Valley to the Gulf of Mexico. This fish is very tenacious of life, and is exceedingly voracious, feeding upon frogs, and various kind of smaller fish.

15. Spotted Catfish. *Ictalurus punctatus* (Rafinesque).

The body of this species is long and rather slender, the head is narrow, caudal fin deeply forked. The color of upper part of body is light olive, lower part silvery, showing on the sides, dark spots, which on some specimens are quite distinct. It is a good food fish. It is found in the channels of the larger streams of the Great Lakes region, and South to the Gulf of Mexico.

16. White Cat. *Ameiurus catus* (Linnæus).

The specimens in the Aquarium were brought from the Susquehanna River. The head is broad and the body stout;



underside of body nearly white; barbels on the under jaw white. Caudal considerably forked. In warm weather the white catfish is quite active.

17. Bullhead; Horned Pout. *Ameiurus nebulosus* (Le Sueur).

Very common; is found in ponds and streams from Ohio east to the coast and Maine to the Gulf of Mexico. The color varies in specimens from different localities; some are quite dark and others are brownish. The caudal is not forked in this species.

18. Albino Catfish.

The specimens on exhibition were caught in a small pool in the Hackensack Meadows, New Jersey. When received at the Aquarium they were orange colored; exposure to strong light, with light surroundings, has caused the fish to change to a much lighter color.

19. Brook Sucker. *Catostomus comersonii* (Lacépède).

This species is found in the streams, ponds, and lakes from Canada to Florida; it is very common and plentiful. The Brook Sucker is the boy's fish. Boys catch it with a hook occasionally, and also with a spear, but oftenest with a snare. It reaches a length of eighteen inches.

20. Chub Sucker. *Erimyzon sucetta* (Lacépède).

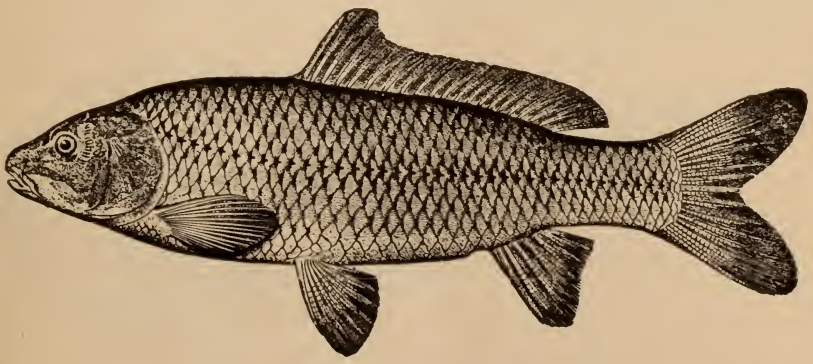
A small species of Sucker, which rarely reaches a length of twelve inches. The color and markings vary with age. Found in the Mississippi Valley, and eastward.

21. Carp. *Cyprinus carpio* (Linnæus).

22. Mirror Carp. Variety.

23. Leather Carp. Variety.

The body of the Scale Carp is usually covered with large regular scales. The Mirror Carp has large irregular scales, and one side of the body may be entirely covered, while the other side shows quite large patches of bare skin. The scales of the Leather Carp also are large and irregular, and generally few



in number, some specimens have only a few scales on the back. The Carp feeds upon both vegetable and animal food, it reaches a weight of sixty to sev-

enty pounds. It is a native of Central Asia, whence it was introduced into Europe and America.

24. Goldfish. *Carrassius auratus* (Linnæus).

There are several varieties of Goldfish exhibited in the Aquarium; some are silvery white with red spots, others are golden with black blotches, and some are termed uncolored. The caudal fin or tail of the goldfish varies in form in the different varieties. There is a goldfish called the triple tail, another known as the fan tail, and still another that has a long, delicate drooping tail.

25. Chub; Fallfish. *Semotilus atromaculatus* (Mitchill).

The young Chub is light brown in color, with a dark nearly black band on the sides, which disappears in the adult. The color of the adult Chub is slate above the lateral line, and silvery below it; the dorsal fin has a black spot at its base and front. The Aquarium has had specimens fourteen inches in length.

26. Roach; Golden Shiner. *Abramis crysoleucas* (Mitchill).

The color of this fish is greenish above the lateral line, and silvery below and sometimes with a golden tinge, the pectoral, ventral, anal, and occasionally the caudal fin, have a tinge of red. This species is very common in the vicinity of New York City.

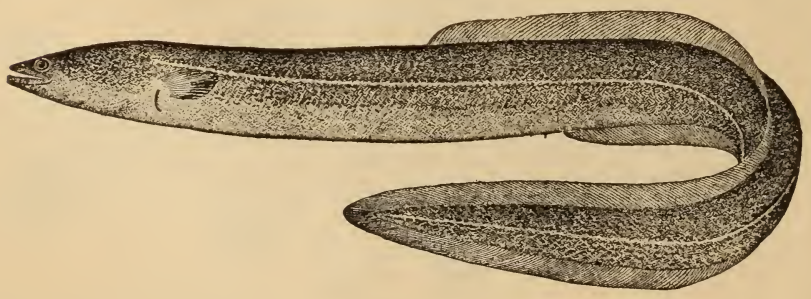
27. Pearl Roach. *Abramis crysoleucas* Variety.

The specimens on exhibition in the Aquarium were taken from the large lake in Central Park, but they are not plentiful there. The pectoral and dorsal fins are tipped with red, the ventral, anal, and caudal fins are of a beautiful shade of vermillion. The Pearl Roach is an exceedingly handsome fish.

28. Redfin. *Notropis umbratalis* [*?*] (Girard).

This species reaches a length of three to four inches. The lower fins of the male are brick red, those of the female are somewhat lighter in color. This little fish is found from Minnesota to New York, and South to Alabama.

29. Fresh Water Eel. *Anguilla chryspa* (Rafinesque).



Is a valuable food fish, and is found in abundance from Canada to Mexico and East of the Rocky Mountains to the Atlantic Coast.

30. Conger Eel. *Leptocephalus conger* (Linnæus).

This species of Eel reaches a length of seven to eight feet. The Conger Eel will raise itself to a vertical position in the tank, supporting itself upon the rear part of its body and retaining this position for an hour or more at a time.

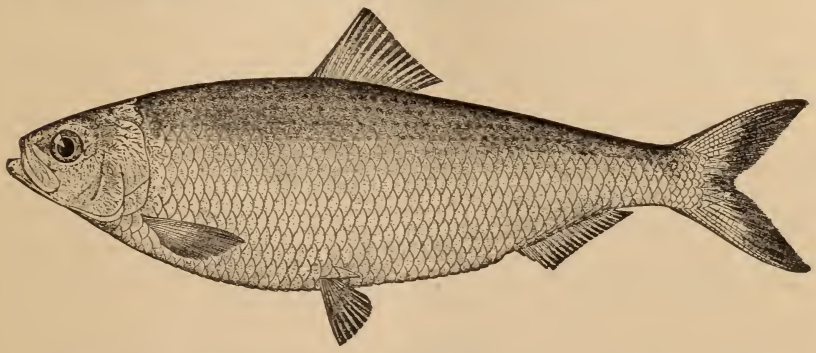
31. Common Spotted Moray. *Lycodontis moringa* (Cuvier).

Its general color is yellowish, the body and the dorsal, and anal fins are covered with small black spots, the eyes are small, and jaws narrow, the snout is rather sharp. The fine specimens on exhibition in the Aquarium were taken at Bermuda.

32. Hickory Shad. *Pomolobus mediocris* (Mitchill).

The Hickory Shad is found on this coast in the fall. It is not highly esteemed as a food fish. In several localities South it is sold with the herring, two of the Hickory Shad counting for one herring. It reaches a length of about twenty inches.

33. Glut Herring. *Pomolobus æstivalis* (Mitchill).



This fish is found on the Atlantic Coast, it is not abundant northward and is not valuable as a food fish.

34. Common Shad. *Alosa sapidissima* (Wilson).

The Shad is found along the greater portion of the Atlantic Coast of the United States, and ascends the larger rivers in the spring to spawn. It reaches a length of two feet.

35. Menhaden; Mossbunker. *Brevoortia tyrannus* (Latrobe).

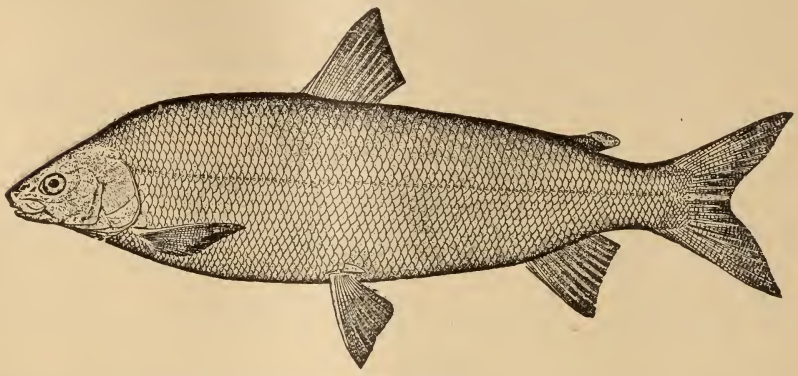
This is probably the most abundant species of fish on the Atlantic Coast of the United States. It is said that the oil product of the Menhaden is of more importance than that of any other marine animal. It is of no importance as a food fish.

36. Round Whitefish. *Coregonus quadrilateralis* (Richardson).

The body of this species is rather long, and slim, and as its name indicates nearly round. Its flavor is excellent. The specimens on exhibition in the Aquarium were taken from one of the Adirondack lakes.

37. Labrador Whitefish. *Coregonus labradoricus* (Richardson).

This Whitefish is found in the cold clear lakes and streams of New York, and Northern New England, and in the Great Lakes. Specimens have been

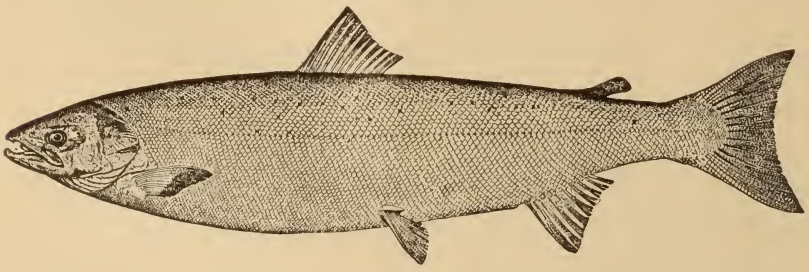


caught in some New Hampshire lakes weighing seven and a half pounds. This fish is highly prized as a food fish.

38. Quinnat Salmon; Columbia Salmon. *Oncorhynchus tschawytscha* (Walbaum).

The Quinnat Salmon reaches a weight of sixty to a hundred pounds. It is the largest of the salmon family. The specimens in the Aquarium, at this writing July 30th, 1898, are fourteen months old and measure seven inches in length.

39. Atlantic Salmon. *Salmo salar* (Linnæus).



This species of salmon inhabits the North Atlantic Ocean. It ascends all the rivers of this country north of Cape Cod that are suited to it, and the rivers of northern Europe. It is well known, and a very highly esteemed food fish.

40. Land Locked Salmon. *Salmo salar sebago* (Girard).

Its home is in fresh water ponds and lakes. In the Aquarium, however, it thrives in salt water. It rarely exceeds a weight of twenty pounds.

41. Ouananiche; Winninish. *Salmo salar ouananiche* (McCarthy).

The Ouananiche is considered by sportsmen the gamiest of all fresh water fish. It rarely reaches a weight of eight pounds. It is found in Lake St. John, the Saguinay River and neighboring waters in Canada.

42. Steelhead. *Salmo gairdneri* (Richardson).

The color of the upper part of the body is olive green, the lower portion silvery, the cheek and gill cover reddish with a bronze tinge. The Steelhead reaches a weight of twenty-two pounds. It is found in the rivers of California, and is abundant in the Columbia River, and the streams farther north.

43. Rainbow Trout. *Salmo irideus* (Linnæus).

The Rainbow Trout is easily recognized by the red lateral stripe. It is a native of the Pacific Coast, but has been propagated, and distributed to a considerable extent in several of the states east of the Rocky Mountains. In the Aquarium it thrives in both fresh and salt water.

44. Brown Trout. *Salmo fario* (Linnæus).

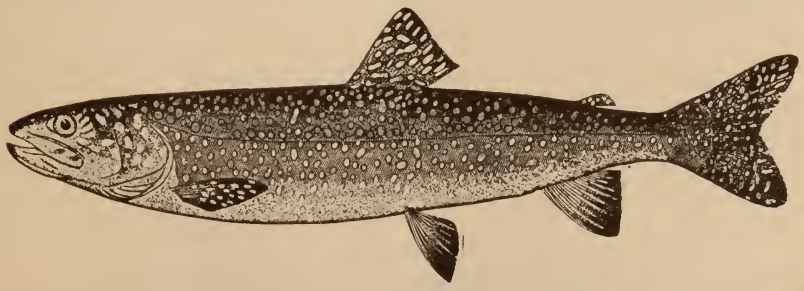
This species is a native of Northern Europe, it was introduced into the United States, and is being propagated, in some of the Hatcheries of this State. The Brown Trout reaches a weight of twenty-two pounds.

45. Hybrid Trout. *Salmo* (Hybrid = fario –|– fontinalis).

This Hybrid is a cross between the Brook Trout, and the Brown Trout, the color and the markings make it a very handsome fish. It is said to be exceedingly gamey, and of fine flavor. The cross is not natural, but is made artificially, and the product is sterile.

46. Lake Trout; Salmon Trout. *Cristivomer namaycush* (Walbaum).

This trout is found in the Great Lakes, Lake Champlain, and many other smaller lakes of the United States, and of British America. It attains a weight



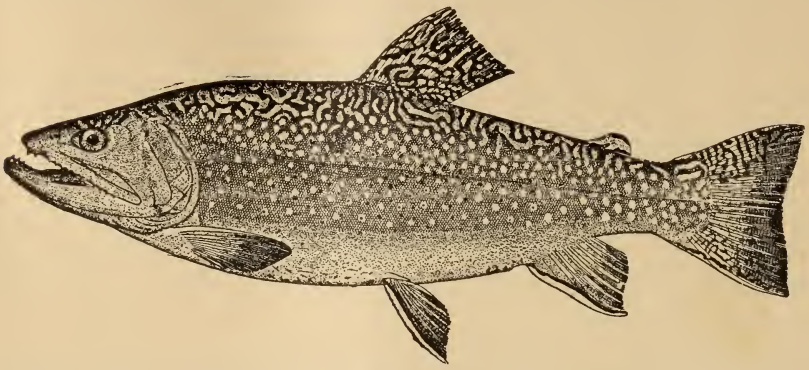
of 50 to 100 pounds. The many different names given to this species are due to its great variation in size and coloring in different waters.

47. Swiss Lake Trout. *Salmo lemanus* [*?*]

A number of specimens of this trout, measuring from two to three inches in length, were received at the Aquarium in the month of November, 1896; at this date August 2, 1898, the largest of these specimens measures 13 inches.

48. Brook Trout; Speckled Trout. *Salvelinus fontinalis* (Mitchill).

There are many local varieties of this species distinguished in size, shape, and shades of color. The size attained varies greatly in different regions. It



inhabits clear, cold streams, and lakes in the northern parts of the United States, east of the Mississippi, and in Canada northward to Labrador.

49. Smelt. *Osmerus mordax* (Mitchill).

This fish is found on the Atlantic coast from Virginia to the Gulf of St. Lawrence, it also enters streams; and it is abundant in many of the lakes of New England, New Brunswick, and Nova Scotia. It feeds upon shrimps and other small crustaceans.

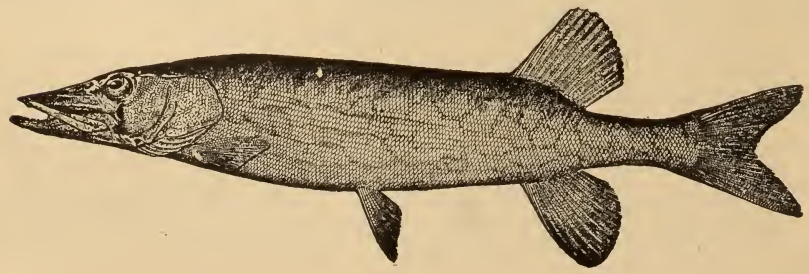
50. Mud Minnow. *Umbra limi* (Kirtland).

A small fish which reaches a length of four inches. Inhabits streams and ditches with a muddy bottom, in fishing for them it is often necessary to stir up the mud before drawing a seine, the fish hiding among the plants, and in the mud.

51. Banded Pickerel. *Lucius americana* (Gmelin).

This pickerel reaches a length of twelve inches. Color olivacious; the sides with about twenty blackish bars, all fins are more or less colored or tinged with orange.

52. Chain Pickerel. *Lucius reticulatus* (LeSueur).



The cheeks and gill covers are covered with scales. Color greenish varying much in shade, the sides with golden tinge, and marked with a network of dark streaks. It reaches a length of twenty-four inches.

53. Pike. *Lucius lucius* (Linnæus).

Color olive green, handsomely marked with white or yellowish spots. Cheeks covered with scales, upper part of gill covers scaly, the lower parts bare. The Pike reaches a length of four feet. It has a broad distribution on both sides of the Atlantic.

54. Mascalonge. *Lucius masquinongy immaculatus* (Gerrard).

This species of fish is said by the best authorities to reach a weight of 100 pounds. The upper parts of cheeks, and gill covers scaly, the lower portions bare.

55. Killifish; Mayfish. *Fundulus majalis* (Walbaum).

This killifish reaches a length of six inches. The males have about a dozen dark transverse bars on the sides of body. The females a variable number of longitudinal dark stripes, more or less interrupted along the sides.

56. Common Killifish. *Fundulus heteroclitus* (Linnæus).

The most abundant of the killifish, and attains a length of three to five inches. It varies considerably in size, and coloration. The range of this fish is from the coast of Maine to the Rio Grande.

57. Fresh Water Killifish. *Fundulus diaphanus* (LeSueur).

This fish attains a length of four inches. It is found in fresh water streams, and lakes from Maine to Georgia.

58. Sheepshead Lebia. *Cyprinodon variegatus* (Lacépède).

The body of this little fish is very short and stout. Color of the male is olivacious from dorsal fin forward above pectoral fins to head deep blue. The female light olive, with several dark bars on sides, dorsal fin with a black spot near the tip of the last rays.

59. Brook Stickleback. *Eucalia inconstans* (Kirtland).

The male is black in the spring, the female is light olive, and dotted with very small black spots. There are generally five sharp spines in front of the dorsal fin. It attains a length of two and a half inches. The male fish build a nest with water plants, in which the female deposits the eggs, the male guarding them till they hatch, and then continuing his watch over the young fish until they are old enough to care for themselves.

60. Nine-Spined Stickleback. *Pygosteus pungitius* (Linnæus).

The body of this species is very slender. It attains a length of three inches. This species is widely distributed.

61. Two-Spined Stickleback. *Gasterosteus bispinosus* (Walbaum).

The upper part of body is greenish, the lower part silvery, In the spring the cheeks, gill covers,

and sides of the body of the male are red. This species is found in salt water. It attains a length of four inches.

62. Four-Spined Stickleback. *Apeltes quadracus* (Mitchill).

This species reaches a length of two and a half inches. The color is brownish above the lateral line, and mottled with a darker shade. The sides silvery.

63. Pipefish. *Siphostoma fuscum* (Storer).

The body is long and very slender, as is also the head; the snout short. Color brown, the under side of body quite light, the sides are mottled, fins small. It feeds upon very small crustaceans.

64. Sea-horse. *Hippocampus hudsonius* (DeKay).

The head of this very interesting little fish resembles in shape that of a horse. Its tail, which is long and tapering, it coils around seaweed, and other floating substances, and it is often carried by currents to great distances. The male carries the eggs and young in a sac on the under part of the body at the base of the tail. The sea-horse attains a length of six inches.

65. Pirate Perch. *Alphredoderus sayanus* (Gilliams).

Its color is dark olive, sometimes nearly black; is said to reach a length of five inches. It is found from New York coastwise to Texas.

66. Silverside; Spearing. *Menidia notata* (Mitchill).

The body is very slender. It is greenish on the upper part of body, the sides being silvery; it attains a length of four inches. The Silverside is abundant on the coast of Long Island.

67. Striped Mullet. *Mugil cephalus* (Linnæus).

This fish is very common; it is found on the Atlantic coast from Cape Cod to Florida, and is plentiful on our Southern Pacific coast. It is a food fish of considerable importance.

68. Squirrel Fish. *Holocentrus ascensionis* (Osbeck).

The body of this species is bright red, the upper portion of the head a darker shade, the eye is large, and very conspicuous. The caudal fin is deeply forked, the upper lobe the longer. This fish is common in the waters of the Bermudas and West India Islands, and on the coast of Florida.

69. Banded Pilot. *Seriola zonata* (Mitchill).

The body is bluish above the lateral line, and very light below, and has five to seven black vertical bands. It is often found in company with the shark. The Pilot fish, as it is generally called, is found in the seas of the temperate and tropical regions.

70. Amber-fish. *Seriola lalandi* (Cuvier and Valenciennes).

This species reaches a length of five feet or more. It is an edible fish. The Amber-fish has been taken in Gravesend Bay. It is found off the West Florida coast, about the Bermuda Islands, and south to Brazil.

Tropical Fishes and Octopus.

71. Crevallé; Cavally. *Caranx hippos* (Linnæus).

This fish reaches a weight of twenty pounds, the average weight, however, being very much less. It is a good food fish. Color olivacious above lateral line, golden below. It is found on the Atlantic coast from Cape Cod south into the tropical seas, and on the Pacific coast from the Gulf of California to Panama.

72. Hard-Tail; Yellow Mackerel. *Caranx crysos* (Mitchill).

This species is abundant on the Gulf coast of Florida, Alabama, and Mississippi, it is common in the Bermudas, and is found along the Atlantic coast north to Nova Scotia. About Pensacola it is known as the Jurel, and is there an important food fish.

73. Threadfish. *Alectis ciliaris* (Bloch).

The spines of the dorsal and anal fins resembling long silk-like threads, are extended in continuation, which are often three or four times the length of the body. It is found on both coasts of tropical America, and ranges north to Cape Cod.

74. Blunt-Nosed Shiner. *Vomer setipinnis* (Mitchill).

A handsome fish with silvery sides. This species reaches a length of ten or twelve inches, and is an excellent food fish. It ranges the warm waters of the Atlantic and Pacific coasts, and is a summer visitor along the Atlantic coast north to Woods Holl, Mass.

75. Moonfish; Look-down. *Selene vomer* (Linnæus).

Two or more spines of the dorsal fin are very much elongated as also are several of the spines of the anal fin. It is common on the Atlantic and Pacific coasts southward. The specimens in the Aquarium were taken in Gravesend Bay.

76. Round Pompano. *Trachinotus falcatus* (Linnæus).

This species ranges from Cape Cod to Brazil. The young are occasionally taken in Gravesend Bay. It is held in less esteem as a food fish than the Common Pompano.

77. Blue-fish; Snapper. *Pomatomus saltatrix* (Linnæus).

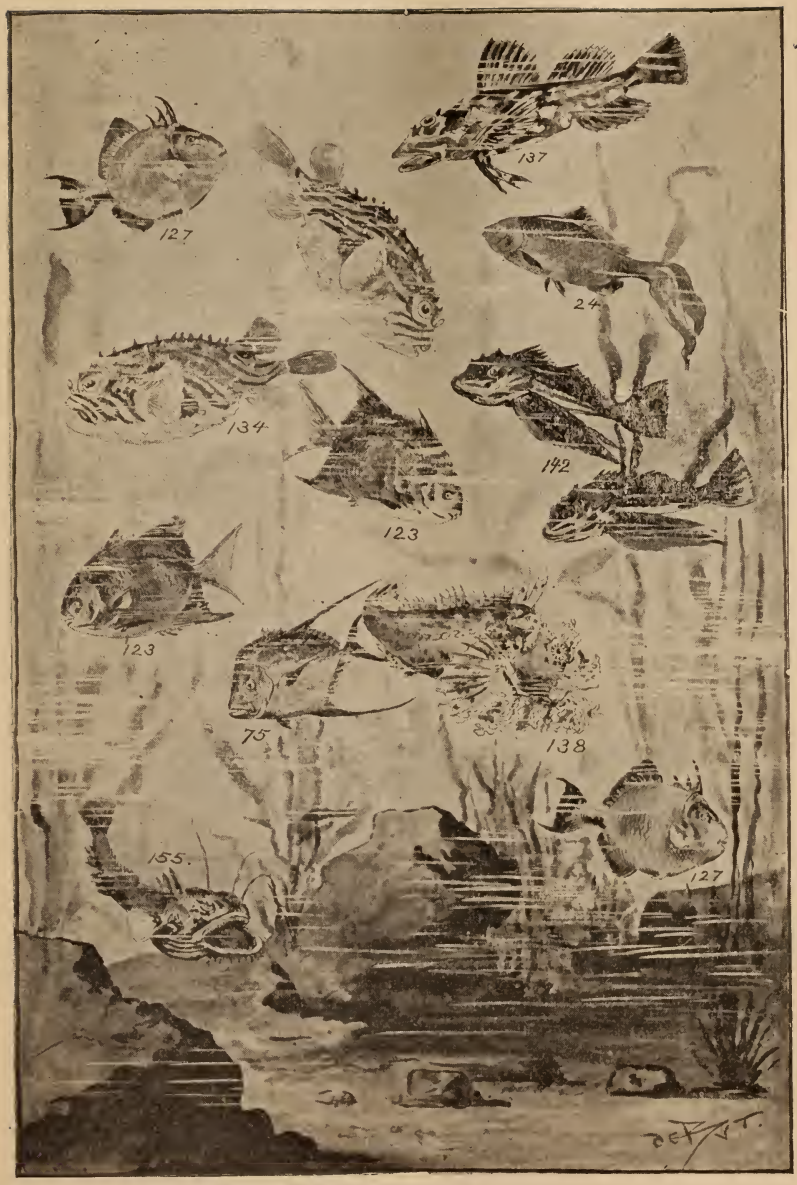
The Blue-fish has a wide range in the Atlantic and Indian Oceans; and is found occasionally in the Mediterranean Sea. It is valued highly as a food fish; it reaches a length of three feet. It is a voracious fish, and is very destructive to other fishes, which it pursues for food.

78. Butter-fish. *Rhombus triacanthus* (Peck).

This fish is found from Maine to Florida, and is quite plentiful on our coast. It is said to reach a length of ten inches. A food fish of fine flavor.

79. Calico Bass. *Pomoxis sparoides* (Lacépède).

The Calico Bass attains a weight of one to two pounds. It is an excellent pan fish; and is a fish well adapted to stocking ponds. It is found from New Jersey to Georgia, in the Great Lake region, and through the Mississippi and Ohio valleys.



PECULIAR AND GROTESQUE FISHES.

80. Mud Sunfish. *Acantharcus pomotis* (Baird).

The Mud Sunfish is of little value as food; it attains a length of five or six inches, and is found from New York to South Carolina.

81. Rock Bass; Red-eye. *Ambloplites rupestris* (Rafinesque).

This species of Bass reaches a length of ten to twelve inches; it is a good food fish. It is found in the lakes of Canada, Vermont, New York and south to Louisiana.

82. Black-banded Sunfish. *Mesogonistius chætodon* (Baird).

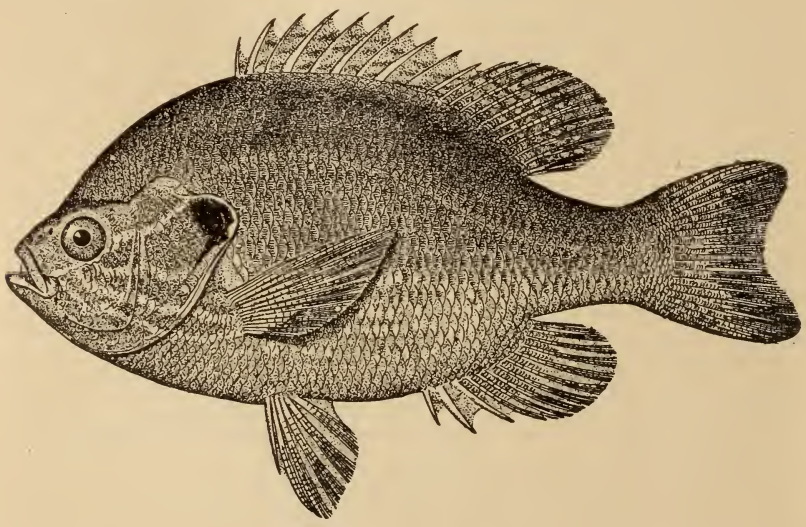
The sides of this Sunfish have six or eight black vertical bars, the first one through the eye; it rarely reaches a length of over four inches. It is found in sluggish streams from New Jersey to Maryland.

83. Long-eared Sunfish. *Lepomis megalotis* (Rafinesque).

This is a handsome Sunfish, its color and markings are delicate and extremely variable. This species attains a length of eight inches. It is found in clear streams, and ranges from Minnesota to South Carolina, and southwest to the Rio Grande.

84. Common Sunfish; Pumpkin-seed. *Eupomotis gibossus* (Linnæus).

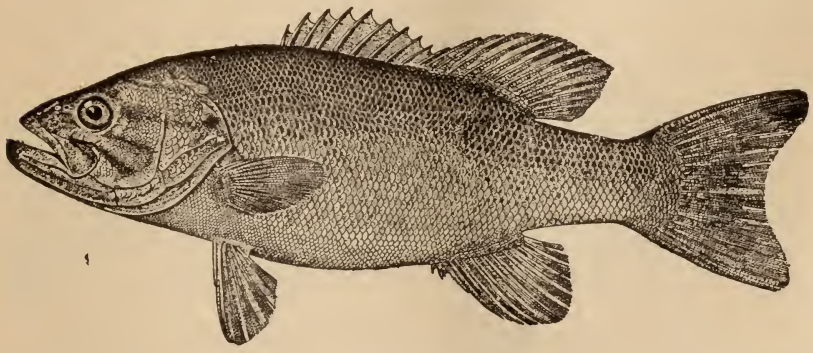
A very common but beautiful fish, and easily distinguished from all our other sunfishes by the bright scarlet mark on the gill covers. It is abundant in



the streams and ponds of New England, New York, in the Great Lake region, and coastwise from Maine to Georgia.

85. Small-mouthed Black Bass. *Micropterus dolomieu* (Lacépède).

The Small-mouthed Bass is considered by many anglers as one of our best game fishes. It has an extended range, being found from Lake Champlain



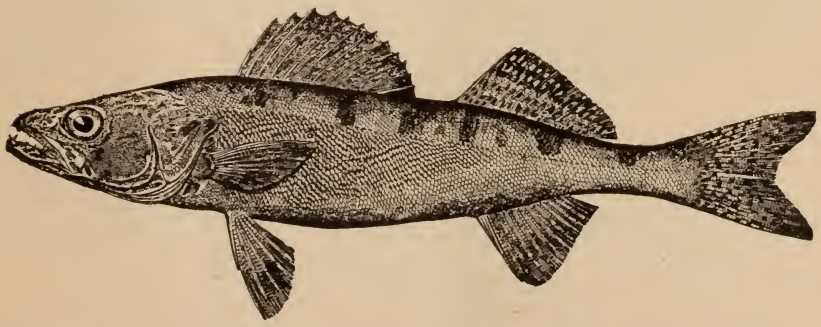
to Manitoba, and southward to South Carolina and Arkansas. It reaches a length of fifteen inches and more.

86. Large-mouthed Black Bass. *Micropterus salmoides* (Lacépède).

The Large-mouthed Bass grows to a length of eighteen to twenty inches; it is less esteemed as a game fish than the small-mouthed. The young have a dark or nearly black stripe along the sides; as the fish grows older the stripe grows less distinct and it may entirely disappear. The Large-mouthed Bass is abundant from the Great Lakes and Red River of the North to Florida, Texas and Mexico.

87. Pike Perch; Wall-eyed Pike. *Stizostedion vitreum* (Mitchill).

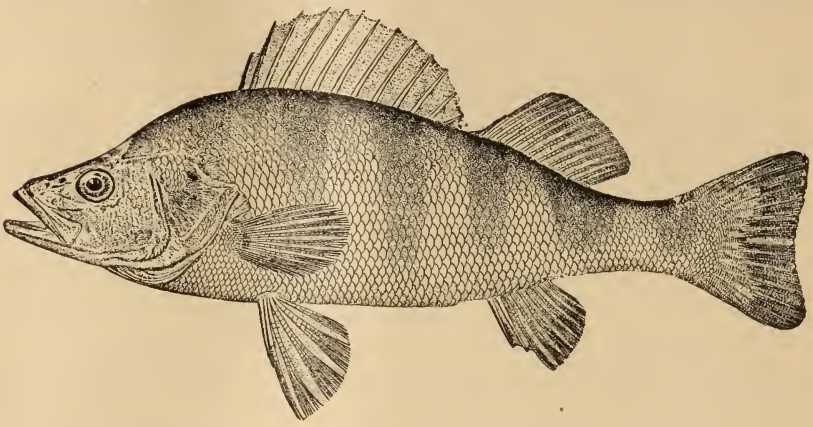
A handsome fish; above the lateral line it is of a dark olive with a golden tinge and beautifully mottled. It attains a weight of ten to twenty pounds, and



is highly valued for food. It ranges from the Great Lake region east to Vermont, New York and Pennsylvania, and south to Georgia and Alabama.

88. Yellow Perch. *Perca flavescens* (Mitchill).

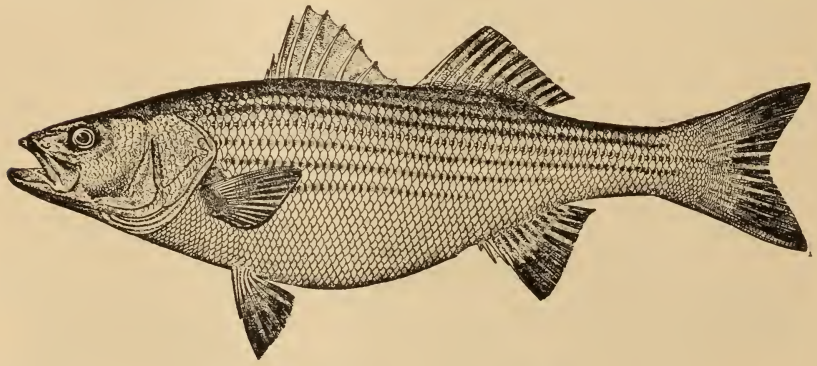
This fish reaches a length of one foot; with its golden sides, with broad dark vertical bars, it is a fish of handsome appearance. It is found in the Great



Lakes and in the smaller lakes, and in ponds and coastwise streams from Nova Scotia to North Carolina.

89. Striped Bass; Rockfish. *Roccus lineatus* (Bloch).

The Striped Bass is abundant on the Atlantic coast of the United States



from Maine to Florida, and ascends all rivers in the spring to spawn. It is an important game and food fish, and attains a weight of thirty to ninety pounds.

90. White Perch. *Morone americana* (Gmelin).

This species is found from South Carolina northward along the Atlantic coast of the United States, and to Nova Scotia, ascending streams, and it is very abundant in many fresh water ponds. It is an excellent pan fish, and reaches a length of six to fourteen inches.

91. Coney; Butter Fish. *Bodianus fulvus* (Linnæus).

The Coney is found in many waters; its range of color is very great. It reaches a length of twelve inches. It is recorded from Bermuda, the West Indies, Brazil and the Cape Verde Islands.

92. Grouper; Hamlet. *Epinephelus striatus* (Bloch).

A characteristic of this fish is its power suddenly and radically to change its color. The Grouper attains a length of four feet or more; it is an important food fish. It is very common in the waters of Bermuda and Key West, and the West Indies to Brazil.

93. Spotted Hind. *Epinephelus adscensionis* (Osbeck).

The Spotted Hind is a very handsome fish; its color and markings are subject to great variations. The specimens in the Aquarium were taken in Bermuda; it is also found in the Gulf of Mexico, and in the waters of the West Indies. It attains a length of two feet or more, and is often found in the markets.

94. Rockfish. *Mycteroperca bonaci* [*?*] (Poey).

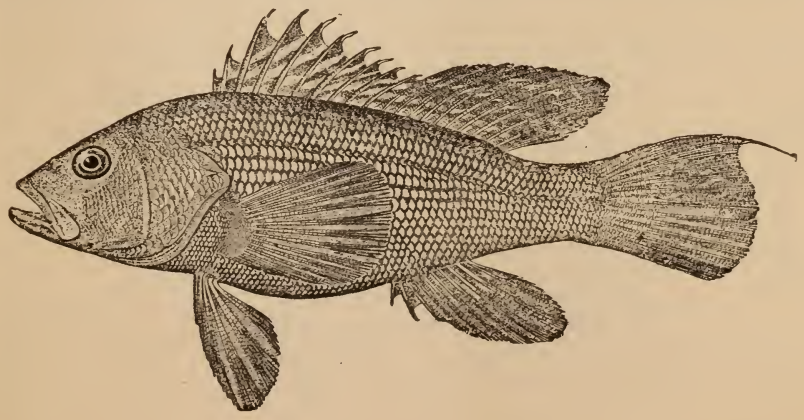
This species attains a length of four to five feet, and is known as one of the choicest of the table fishes of Bermuda. It is found in the West Indies and from Florida to Brazil; it is abundant about Key West.

95. Princess Rockfish. *Mycteroperca bonaci xanthosticta* [*?*] (Jordan and Swain).

A very handsome fish. The general color is light olive, the head and body with dark spots either round or oblong, the soft dorsal, anal, and caudal fins with dark spots, the outer edges whitish. The specimens in the Aquarium were taken in Bermuda. It is found also on the Snapper Banks off Pensacola.

96. Sea Bass. *Centropristes striatus* (Linnæus).

The Sea Bass reaches our coast in the early part of May, and remains through the summer. It is found along the Atlantic coast from Cape Ann to



Florida. A food fish of excellent flavor; it reaches a weight of three pounds and more.

97. Gray Snapper. *Neomænis griseus* (Linnæus).

This fish is abundant in the waters of Bermuda; it is distributed along the southern Atlantic coast of the United States and south to Brazil. It attains a length of four feet. It is a delicious food fish.

98. Red Snapper. *Neomænis hastingsi* (Bean).

The specimens in the Aquarium were taken in Bermuda, where this fish is often called the Bermuda Red Snapper. It is much esteemed as a food fish. This species attains a weight of ten pounds or more.

99. Spot Snapper. *Mesoprion uninotatus* (Cuvier and Valenciennes).

The Spot Snapper is easily recognized by an irregular dark spot on the body near the dorsal fin, and also by a number of yellow stripes lengthwise of the body. It is plentiful in the Bermuda Islands.

100. Yellow-tail. *Ocyurus chrysurus* (Bloch).

This fish has a yellow stripe along the middle of the body from the gill cover to the base of the caudal fin; the caudal fin is deeply forked, and is yellow. It is found on the coast of Florida, in the West Indies, and the Bermuda Islands.

101. Margate-fish. *Hæmulon album* (Cuvier and Valenciennes).

The Margate-fish is found in the waters of Brazil; throughout the West Indies, the Bermuda Islands, and on the Gulf coast of Florida. It attains the length of nine to eighteen inches.

102. Yellow Grunt. *Hæmulon sciurus* (Shaw).

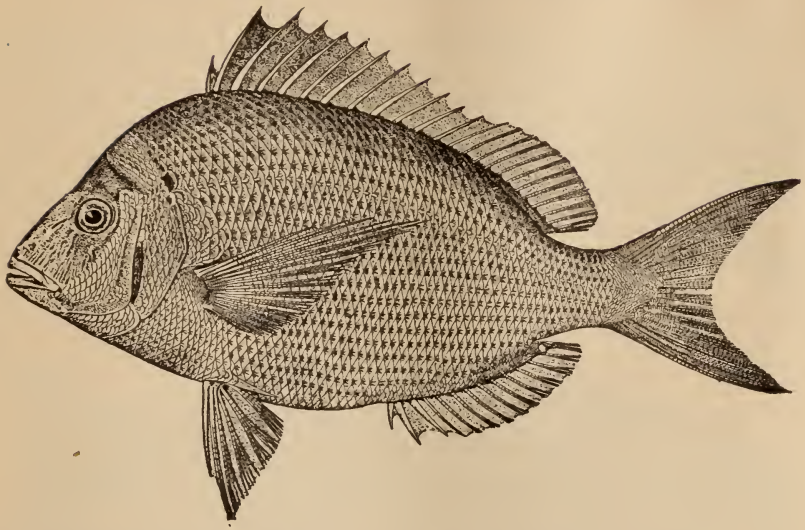
This fish, like the other species of Grunt, is distinguished by the bright red color of the inside of the mouth and throat. It is a food fish of importance. It is found in the Bermuda Islands, and the West Indies to Brazil.

103. Striped Grunt. *Hæmulon elegans* (Cuvier and Valenciennes).

This is a handsome fish, the sides have many horizontal light blue stripes edged with brown, the dorsal fin is light brown with whitish tip; caudal fin brown with outer portion nearly white. It is found at Key West, and is plentiful in the Bermuda Islands.

104. Common Grunt. *Hæmulon plumieri* (Lacépède).

The Common Grunt is variable in color and markings. The upper portion of body light brown, the lower portion lighter with bluish tinge; at times a brown stripe is seen along the lateral line, and another one midway between that and the base of dorsal fin. It is found in the Bermuda Islands, and is abundant from Cape Hatteras to Florida.

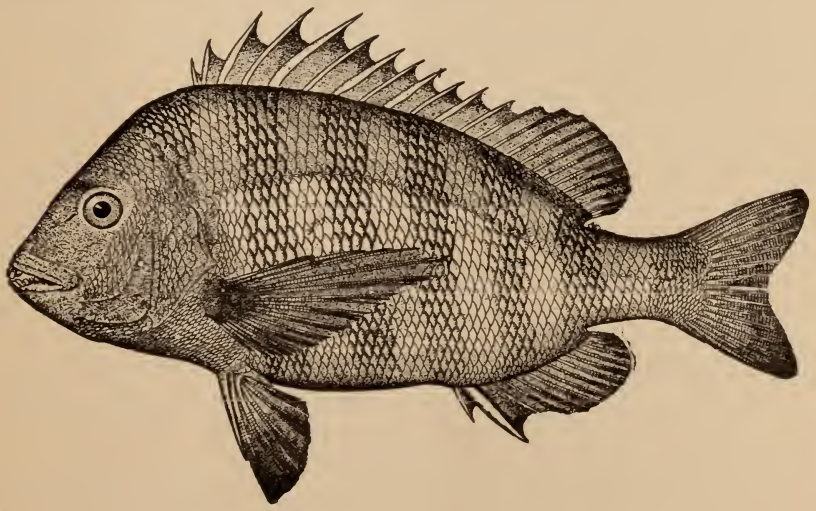


105. Common Scup; Porgy. *Stenotomus chrysops* (Linnæus).

The Scup is found along the Atlantic coast from Cape Cod to South Carolina. It attains a weight of two to four pounds. It is a food fish of good flavor.

106. Sheepshead. *Archosargus probatocephalus* (Walbaum).

This fish derives its name from the resemblance of its profile and teeth to those of a sheep. It ranges from Cape Cod to Florida. Length ten to twenty inches. Its flesh is considered by many people a delicacy.



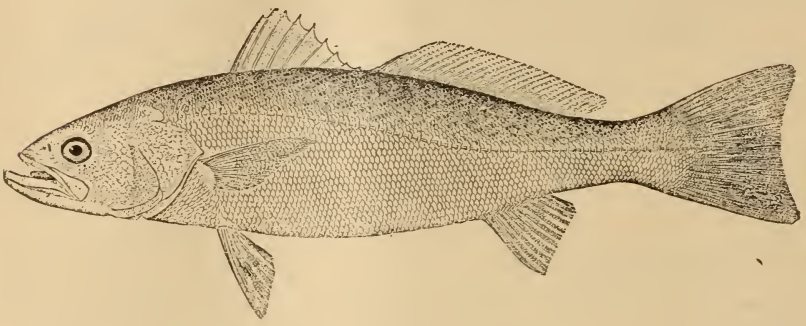
107. Silver Bream. *Diplodus argenteus* (Cuvier & Valenciennes).

The Silver Bream, which is easily identified by a black spot on the body behind the dorsal fin, attains a length of six to twelve inches. It is found in waters of the West Indies, Florida and the Bermudas, and south to Argentina.

108. Bermuda Chub. *Kyphosus sectatrix* (Linnæus).

This fish is an important food species of Bermuda. It is occasionally taken on our coast. It is found in the West Indies and in the waters of the Canary Islands.

109. Common Weakfish; Squeteague. *Cynoscion regalis* (Bloch and Schneider).



The Weakfish ranges from Cape Cod south to Mexico. It is an important food fish, and attains a weight of ten pounds. On the southern coast it is known as the Sea Trout.

110. Banded Larimus. *Larimus fasciatus* (Holbrook).

Specimens of this species have been taken in Gravesend Bay. It is rare north of Chesapeake Bay, but is found south to Galveston, Texas.

111. Silver Perch. *Bairdiella chrysura* (Lacépède).

The Silver Perch does not exceed a length of eleven inches. It is an excellent pan fish. This species is found from Long Island to Texas.

112. Red Drum; Channel Bass. *Sciaenops ocellatus* (Linnæus).

The specimen in the aquarium was taken on the coast of New Jersey. It ranges south to Texas where it is very abundant. It attains a weight of forty pounds and is much esteemed for food.

113. Spot; Lafayette. *Leiostomus xanthurus* (Lacépède).

The Spot is a good pan fish, and attains a length of six to ten inches. It is found along the Atlantic coast of the United States from Cape Cod to Texas.

114. King Fish. *Menticirrhus saxatilis* (Bloch and Schneider).

The King Fish ranges from Cape Ann to Florida, but is more abundant northward. It is esteemed highly as a food fish.

115. Drum. *Pogonias cromis* (Linnæus).

This fish reaches a weight of eighty pounds. The teeth of the Drum are extremely heavy, and the jaws so strong that it crushes the shells of oysters,

which are its favorite food. It is found on the coast of Long Island south to Mexico.

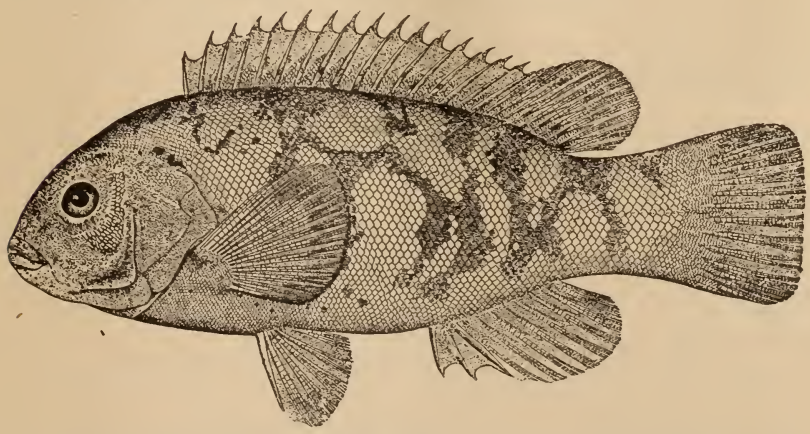
116. Sergeant Major; Cowpilot. *Abudefduf saxattilis* (Linnæus).

This species rarely reaches a length of more than six inches. It has five black bands, the spaces between them are at times a golden green. This fish is found in the waters of Bermuda and on both coasts of tropical America.

117. Cunner; Bergall. *Tautogolabus adspersus* (Walbaum).

This fish reaches a length of six to twelve inches. It ranges from Labrador to New Jersey; abundant northward. From Eastport, Maine, to Boston.

118. Blackfish; Tautog. *Tautoga onitis* (Linnæus).



The Tautog is found on rocky coasts. It is more or less abundant from New Brunswick to Charleston, South Carolina. It is a food fish of importance.

119. Hogfish. *Lachnolaimus maximus* (Walbaum).

This fish attains a weight of twenty pounds, and is held in high esteem as a table fish; the flesh is of excellent flavor. The hogfish is found at Key West, and the waters of the West Indies, and of the Bermuda Islands.

120. Lady-fish. *Harpe rufa* (Linnæus).

The Lady-fish is very handsome in color. At the Bermudas it is considered an excellent food fish. This species also occurs in the Gulf of Mexico, in the West Indies, at Key West, and south to Brazil.

121. Green Parrot-fish. *Sparisoma viride* (Bonnaterre).

This fish is so named because of its resemblance in colors to the green parrot. It is one of the handsomest fish found in the waters of the Bermuda, and the West India Islands.

122. Blue Parrot-fish. *Scarus cæruleus* (Bloch).

This is a very beautiful fish. The head has irregular narrow markings of light blue, and there are spots of the same color on the base of each scale. The specimens in the Aquarium were taken in the waters of Bermuda.

123. Spade-fish. *Chætodipterus faber* (Broussonet).

The Spade-fish ranges from Cape Cod south, and is said to be abundant on the coast of South Carolina; it is also found on the coast of Southern California. The Spade-fish is highly esteemed as a food fish. It attains a length of eighteen inches.

124. Four Eyed; Bride Fish. *Chætodon capistratus* (Linnæus).

It is named Four Eyed from the dark spots on the body near the tail. It is found in the sheltered coves in the waters of Bermuda; and is recorded from the West Indies.

125. Angel Fish. *Angelichthys ciliaris* (Linnæus).

This species is found in the West Indies, also in Key West, and is abundant in the Bermuda Islands. It attains a weight of four pounds. It is most delicious in flavor, and in the beauty of its hues it far surpasses all the other fishes of Bermuda.

126. Surgeon-fish. *Teuthis hepatus* (Linnæus).

On each side of the body near the base of the tail is a longitudinal groove which contains a sharp lancet-like spine; the fish thrusts these spines out at nearly right angles to the body; other fish are liable to injury from them. It is found on the coasts of South Carolina to Florida, the West Indies, and in the waters of Bermuda.

127. Trigger-fish; Turbot. *Balistes carolinensis* (Gmelin).

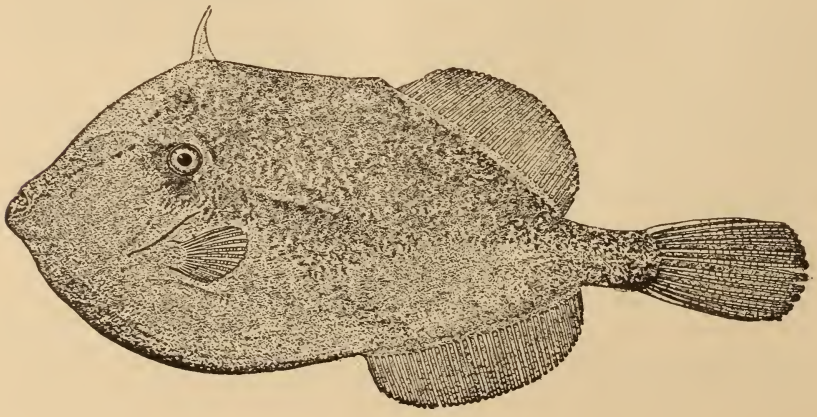
The Trigger-fish is often seen swimming on its side near the surface of the water. It is taken occasionally on our coast, south to Tortugas; and at the Bermuda Islands, where it is a food fish of importance.

128. File-fish. *Monacanthus hispidus* (Linnæus).

This species ranges from Cape Cod south to Florida, the West Indies, and the Bermuda Islands. The File-fish swims with the dorsal and anal fins.

129. Orange Filefish. *Alutera schoepfii* (Walbaum).

The Orange Filefish is found during the warm season north to Cape Cod, and ranges south to Florida. The young of this species have several dark stripes and blotches on the sides.



130. Trunk Fish; Triangular Fish. *Lactophrys trigonus* (Linnæus).

A fish of very peculiar shape; being triangular in form. Its body is covered with a hard case or shell. The Trunk fish attains a length of eight inches. It is found in Bermuda, and from Key West northward to Massachusetts.

131. Cowfish. *Lactophrys tricornis* (Linnæus).

The Cowfish has two horn-like spines just above the eyes. It attains a length of twenty inches. This species is found in Chesapeake Bay, south to Texas, eastward to Guinea, and the Cape of Good Hope, and in the waters of Bermuda.

132. Rabbit-fish. *Lagocephalus lævigatus* (Linnæus).

The Rabbit-fish is occasionally taken from Cape Hatteras north to Cape Cod. It attains a weight of five to six pounds.

133. Puffer; Swell-fish. *Spheroides maculatus* (Bloch & Schneider).

This species is taken from Cape Ann to Florida; the young and adult fish are plentiful in Gravesend Bay during warm weather. The puffer is able to inflate itself with air, taking the form of a ball, whence its name.

134. Spiny Box Fish. *Chilomycterus choepfii* (Walbaum).

The surface of the body is covered with short spines. It is found from Cape Cod to the West Indies.

135. Millers-Thumb. *Uranidea gracilis* (Heckel).

A peculiar little fish, with a habit of hiding under stones and burrowing in sand or gravel on the bottom. It is found in the streams of New England and New York.

136. Mitchills Sculpin. *Acanthocottus æneus* (Mitchill).

This species is known on this coast by fishermen as the Pigmy Sculpin from its small size. The eggs of this fish have a beautiful green color. It is recorded from the Bay of Fundy to New York.

137. Sculpin; Hacklehead. *Acanthocottus octodecimspinosus* (Mitchill).

This Sculpin is abundant from Labrador to Virginia. It is of little economic value, fishermen often use this species for lobster bait.

138. Sea Raven. *Hemitripterus americanus* (Gmelin).

The colors of the Sea Raven vary greatly; some are orange with dark blotches; others are brick red with dark markings. This fish ranges from Chesapeake Bay northward to Nova Scotia.

139. Lumpfish. *Cyclopterus lumpus* (Linnæus).

This fish is widely distributed, ranging from the Chesapeake Bay to Greenland, and it is found on the coast of France. It has a peculiar suctorial organ on the underside of the body enabling it to cling to rocks and shells.

140. Toadfish. *Opsanus tau* (Linnæus).

The Toadfish has a broad head and large mouth, which it uses in making a burrow under rocks or stones; it takes a quantity of gravel in the mouth, swimming with it to a little distance, depositing there and repeating the operation

until the burrow is large enough to receive its body. This fish ranges from Massachusetts to Florida.

141. Mutton-fish; Eel Pout. *Zoarces aguillaris* (Peck).

In the shape of its body and fins the mutton-fish resembles the eel; its head is larger. Its flesh is like mutton in flavor. It is found from Delaware to Labrador.

142. Sea Robin; Gurnard. *Prionotus carolinus* (Linnæus).

This species is the earliest of the Sea Robin to arrive on this coast in the Spring. The pectoral fins, or wings, as these fins are commonly called by fishermen, are very large and beautiful in color. It ranges from Cape Ann to South Carolina.

143. Red-winged Sea Robin. *Prionotus strigatus* (Cuvier and Valenciennes).

The Red-winged Sea Robin is so named from the beautiful bright colors of its pectoral fins; these fins resemble the butterfly wings in color and markings. It is found from Cape Cod to Virginia.

144. Striped Sea Robin. *Prionotus evolans* (Linnæus).

This species is easily distinguished by the dark stripes along the sides and the very long wings. In some localities the Sea Robin is used for food.

145. Remora. *Echencis naucrates* (Linnæus).

The Remora has a flattened oval surface on the top of the head, composed of a number of transverse cartilaginous plates, constituting a sucking disk, which enables it to attach itself to the under side of larger fishes. It is found in the warm waters of the Pacific north to San Francisco and in the Atlantic north to Cape Cod.

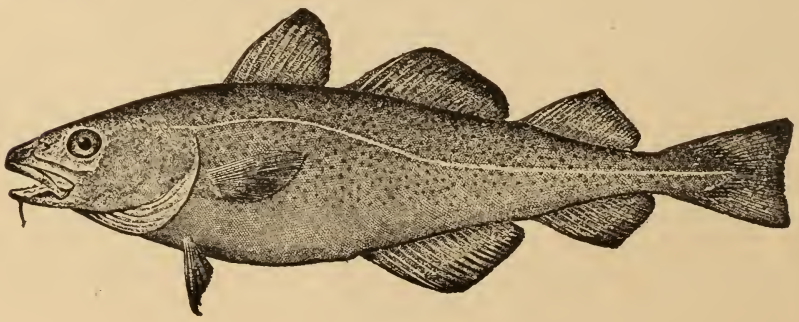
146. Whiting. *Merluccius bilincaris* (Mitchill).

This species is found from New Jersey north to the Gulf of Saint Lawrence In the vicinity of the Bay of Fundy this fish is called Silver Hake.

147. Tom Cod. *Microgadus tomcod* (Walbaum).

The Tom Cod ranges from Virginia to Labrador. In several places on the coast it is known as the Frost-fish. In the early part of winter it approaches the shores, and ascends the rivers for the purpose of spawning. The Tom Cod is highly esteemed as a food fish.

148. Cod. *Gadus callarias* (Linnæus).



The Codfish is one of the most valuable of the food fishes. It is found in the North Atlantic south to Virginia; it is abundant on the coast of New England and New Foundland. The size of the Cod varies greatly in different waters, ranging in weight from three or four to one hundred and sixty pounds.

149. Burbot; Lawyer. *Lota maculosa* (Le Sueur).

There is a diversity of opinion in regard to the use of the Burbot as a food fish; in some regions it is eaten and in others not. It is found in New York, New England, Canada, and the Columbia River Basin.

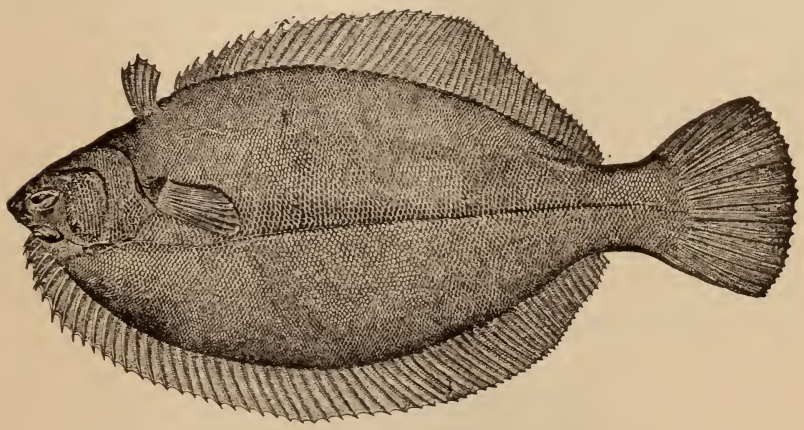
150. Spotted Codling. *Phycis regius* (Walbaum).

This species is found in the North Atlantic south to North Carolina. It is said to be abundant in Chesapeake Bay.

151. Hake. *Phycis tenuis* (Mitchill).

Great quantities of the Hake are taken on the coast of Massachusetts, and it is abundant northward. It is salted and dried in the same manner as the Cod.

152. Fluke; Flounder. *Paralicthys dentatus* (Linnæus).



This species attains a length of sixteen to thirty inches. It is an important food fish. It ranges from Cape Cod to Florida. Several local names are applied to this fish, among them are Summer Flounder and Plaice.

153. Flatfish. *Pseudopleuronectes americana* (Walbaum).

This species is also called Winter Flounder. It reaches a length of fifteen inches. The flesh of this fish is of excellent flavor. It is found on the Atlantic coast of the United States from Chesapeake Bay to Labrador.

154. American Sole. *Achirus fasciatus* (Lacépède).

The American Sole is of no importance as an article of food. In the aquarium it is often seen clinging to the glass or side of the tank. This fish is found from Boston to the mouth of the Mississippi River.

155. Angler; Goosefish. *Lophius piscatorius* (Linnæus).

This grotesque appearing fish is found on both coasts of the North Atlantic It feeds upon fish of various kinds. In a tank in the aquarium an Angler has attempted to swallow one of its own kind nearly two-thirds its size.

156. Climbing Perch. *Anabas scandens* (Cuvier).

This fish is remarkable for its power of living a long time out of water. and making its way on land for considerable distances. It is found in the fresh waters of Cochin China.

157. Gourami. *Asphromenus cantoris.*

A small fresh water fish from the East Indies. A peculiarity of this fish is found in two delicate thread-like appendages attached to the under side of the throat and extending back to the base of the caudal fin.

158. Tench. *Tinca tinca* (Linnæus).

159. Gold Tench. Variety.

The Tench is a European fish. It was introduced into the United States. The habits of the Tench are similar to those of the Carp. It is an exceedingly hardy fish.

The Gold Tench is probably a variety, not a separate species; its variations in color being apparently the only difference.

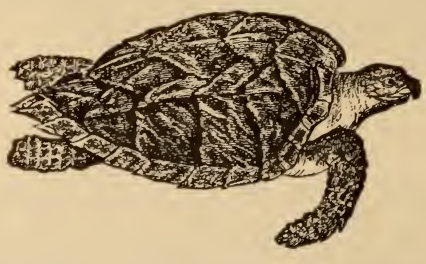
160. Golden Ide. *Idus idus* (Linnæus).

This fish is a native of Europe. It has not as yet become well established in any part of the United States.

REPTILES.

161. Hawksbill Turtle. *Eretmochelys imbricata* (Linnæus).

This turtle derives its name from the hawk-like shape of its beak. It is valuable for the plates or scales which cover its shell; these plates form the tortoise shell of commerce. When the turtle reaches a weight of one hundred pounds the plates are of suitable size and thickness to be used in the arts.



The Hawksbill Turtle is found in the Gulf of Mexico, among the West Indies, and south to Brazil.

162. Green Turtle. *Chelonia virgata* (Schweigger).

The larger specimen of Green Turtle in the Aquarium was taken in the Pacific Ocean off the west coast of Borneo. It attains a weight of six to eight hundred pounds; the flesh is an excellent article of food.

163. Soft-shell Turtle. *Aspidonectes spinifer* (Le Sueur).

This species is found in the northern and middle tributaries of the Mississippi, and in the Great Lakes. Its flesh is considered a delicate article of food in the regions where it is found. The margin of the shell is cartilaginous.

164. Snapping Turtle. *Chelydra serpentina* (Linnæus).

A widely distributed species, being found in the greater portion of the United States. It reaches a weight of fifteen to thirty pounds, and is esteemed as food. This turtle feeds upon fishes, frogs, and makes incursions on the land where it catches for food small chickens and turkeys.

165. Musk Turtle. *Aromochelys odorata* (Latraille).

The length of the shell of this turtle is three to four inches. It emits a very disagreeable odor, which prevents its being used for food. It is distributed over a large part of the United States.

166. Slider Terrapin. *Pseudemys rugosa* (Shaw).

This is one of the Fresh-water Terrapins, and inhabits marshy localities. It ranges from New York south to the streams emptying into Chesapeake Bay. It is used for food.

167. Geographical Terrapin. *Malacoclemmys geographicus* (Le Sueur).

This species of Terrapin is not common. The color of upper shell is dark olive brown, with greenish and yellowish markings. It is found in New York and New Jersey. The specimens in the Aquarium were taken in Ohio.

168. Diamond-back Terrapin. *Malacoclemmys palustris* (Gmelin).

This species is found on the Atlantic Coast from Nantucket to Texas, most abundantly on the coasts of Chesapeake Bay and the Carolinas. It inhabits the salt marshes near the coast. The Diamond-back is highly esteemed for food.

169. Pond Turtle. *Chrysemys picta* (Herman).

The shell of the Pond Turtle reaches a length of six to seven inches. It lives in ponds and ditches, and is often seen on floating logs. It ranges from Nova Scotia to Wisconsin, southward to Georgia and Louisiana.

170. Box Turtle. *Cistudo carolina* (Linnæus).

This species of Turtle has the power of enclosing the head and limbs within the shell; whence the name Box Turtle. It is distributed over the northern portion of the United States, from the eastern coast to the Mississippi River.

171. Spotted Turtle. *Chelopus guttatus* (Schweigger).

The Spotted Turtle is a species of little importance, being of small size. Its name is derived from the yellow spots on the upper shell. It ranges over the New England States, New York, and Pennsylvania to Ohio.

172. Wood Turtle; Striated Turtle. *Chelopus insculptus* (Le Conte).

The markings on the plates of the upper shell of this turtle are quite distinct and have the appearance of sculpture. It is found from Maine to New York, and Pennsylvania to Ohio.

173. Blanding's Terrapin. *Emys meleagris* (Shaw).

A rare species of Turtle and little is known of its habits. The specimen in the Aquarium was taken in Ohio. It is found in the New England States westward to Wisconsin.

BATRACHIANS.

174. Newt; Spotted Triton. *Diemyctylus viridescens* (Rafinesque).

The Newt is at first a tadpole and does not become perfect in form until several weeks after hatching. The Newt inhabits ponds and ditches of still water. It feeds upon water insects and worms.

175. Mud-puppy. *Menobranchus lateralis* (Say).

The gills of the Mud-puppy are external, in the form of fringed tufts, three

on each side. The body is brown with dark spots. The Mud-puppy is found in the Eastern States, the Great Lakes and tributaries.

176. Hellbender. *Cryptobranchus alleghaniensis* (Harlan).

The Hellbender has a broad head and small eyes; there is a prominent fold of skin along the sides of the body. It is found in New York State, in the Alleghany River and the tributaries of the Ohio River.

177. Common Bull-frog. *Rana catesbiana* (Shaw).

This species is the largest of its kind that inhabits North America. It feeds upon insects, small fishes, tadpoles and small frogs. The bull-frog is found over the greater portion of the United States.

178. Green-frog; Spring-frog. *Rana clamata* (Daudin).

The Green Frog or Spring Frog is the first species heard in the spring. It does not hunt for food on the land. This frog inhabits swamps and marshes which are in proximity to ponds and streams. It ranges through the Eastern and Central States northward to Canada.

179. Leopard Frog. *Rana virescens* (Kahn).

A very widely distributed species, it ranges from Maine west to the Sierra Nevada Mountains, and from Canada south to Central America. Its usual color is bright green, with irregular dark brown or black spots, and olive green blotches.

CRUSTACEANS.

180. Lobster. *Homarus americanus* (Edwards).

The American Lobster ranges from Delaware to Labrador, it is most abundant on the coast of Maine. The lobster varies greatly in color, some are yellowish red with mottlings of green, others have blue mottlings. A lobster measuring forty-two inches in length was caught on the coast of New Jersey in March 1897, it weighed thirty pounds.

181. Rock-crab. *Cancer irroratus* (Say).

This species is often found hiding under stones and rocks near low water mark. It attains a size of three or four inches across the shell. The Rock-crab ranges from Labrador to South Carolina.

182. Mud-crab. *Panopeus depressus* (Smith).

A small crab, and rarely attains a length of more than two inches. Its body is flattened. The large claws are unequal in size. This species is found from Cape Cod to Florida.

183. Green-crab. *Carcinus granulatus* (Say).

This species is conspicuous, because of its bright green color and yellow spots. It is found under the stones near the high water mark, and also in tidal pools. The Green-crab ranges from Cape Cod south probably as far as Florida.

184. Lady-crab; Sand-crab. *Platyonichus occellatus* (Latreille).

This is a very handsome crab. Its color is light gray, with spots formed by small red and purple specks. The Lady-crab is provided with swimming organs, on the rear part of the body, enabling it to swim quite rapidly. It is found from Cape Cod to Florida.

185. Blue-crab; Edible-crab. *Callinectes hastatus* (Ordway).

The Blue-crab, like the Lady-crab, has swimming organs resembling flattened legs. It can be easily distinguished from all the other species in these waters by the sharp spine on each side of the shell. This crab inhabits muddy bottoms. It ranges from Massachusetts Bay to Florida.

186. Spider-crab. *Libinia canaliculata* (Say).

This is a curious crab, with long spider-like legs. It inhabits sandy shores, but more commonly makes its home on muddy bottoms in which it hides. It is found from Cape Cod to Florida.

187. Small Hermit Crab. *Eupagurus longicarpus* (Stimpson).

An interesting little crab, living in an empty spiral shell of some of the gastropods or snails, which it seeks for the protection of the rear portion of its body which is soft. When it has outgrown the shell the crab looks up a larger one, and after careful examination of it, inside and out, if suited, it leaves the one it

has been occupying and backs into the larger one. In case of danger the Hermit-crab withdraws its entire body inside the shell, using the large claws to close the aperture. It is found from Massachusetts Bay to South Carolina.

188. Large Hermit Crab. *Eupagurus pollicaris* (Stimpson).

This is a much larger species than *E. longicarpus*. It has shorter and thicker claws, and necessarily occupies larger shells. Its habits are similar to those of the smaller species. It ranges from Massachusetts Bay to Florida.

189. Land Hermit Crab. *Cenobita diogenes.*

The Land Hermit-Crab, as its name indicates, inhabits the land; it occupies some shell obtained from a neighboring beach. It visits the sea to moisten its gills. This crab feeds upon the cocoanut and banana. It is found in the West India Islands, and in the states bordering on the Gulf of Mexico.

190. Horseshoe Crab; King Crab. *Limulus polyphemus* (Latreille).

An inhabitant of sandy shores, but it is more abundant on muddy bottoms. It burrows just beneath the surface of the sand or mud, It is found from Maine to Florida.

191. Fiddler Crab; Soldier Crab. *Gelasimus pugilator* (Latreille).

This species of Fiddler Crab is found upon muddy and sandy flats and beaches. It ranges from Cape Cod to Florida. The Fiddler Crab excavates a hole for a burrow above the tides.

192. Cray-fish; Craw-fish. *Cambarus affinis* (Erichson).

This is the largest of fresh-water crustaceans. It is found in many of the streams of the United States. The Cray-fishes strongly resemble the Lobster, to which they are closely related.

193. Spiny Lobster. *Palinurus vulgaris.*

A native of Bermuda. It is highly esteemed for food. The bright colors and mottlings, with the long slender antennæ which project forward from the head, and the curved horns over the eyes, distinguish this species from the common Lobster.

194. Sand Shrimp. *Crangon vulgaris* (Fabricus).

This species of shrimp is abundant on sandy shores, from South Carolina to Labrador. It imitates closely in color the sand in which it buries itself. In some localities it is used for food.

195. Silver Shrimp. *Mysis stenolepis* (Smith).

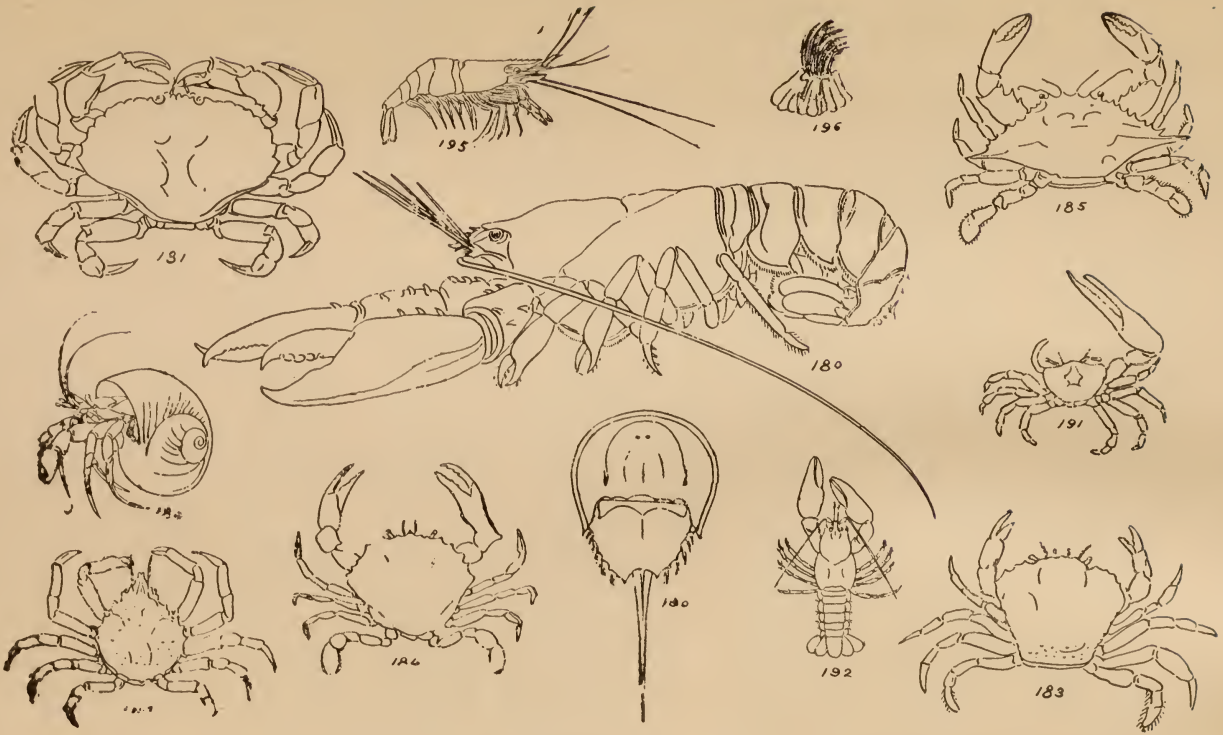
It is found on muddy shores among the eel grass. It is sold in some of the markets for fish bait; large quantities of this shrimp are used in the Aquarium as food for fishes.

196. Ivory Barnacle. *Balanus eburneus* (Gould).

This species is abundant on submerged wood work and on the piles and timbers of the wharves. It is easily distinguished from all other species because of its smooth white shell.

197. Goose Barnacle. *Lepas fascicularis* (Elis and Solander).

The Goose Barnacle adheres to floating sea weed, pieces of wood, and to the bottom of vessels, by a fleshy stem which is about the length of the shelly part. It lives but a short time in aquariums.



CRUSTACEANS.

ANNELIDS.

198. Tube Worm. *Cistenides gouldii* (Verrill).

This is a very interesting worm ; it constructs a conical, slightly curved tube of grains of sand in a single layer, the grains being held together by a water proof cement, a secretion of the tube-worm. It is found from Cape Cod to New Jersey,

199. Serpula. *Serpula dianthus* (Verrill).

This worm surrounds itself with a very crooked calcareous tube generally attached to shells ; it lives in colonies. It has beautifully colored, delicate, feather-like gills, which protrude from the tube ; being disturbed it immediately draws its gills back out of sight. It is found from Cape Cod to New Jersey.

200. Sabella. *Sabella microphthalma* (Verrill).

An annelid, or worm, and is related to Serpula ; its tube, which is tough and flexible, is constructed of fine sand and other substances, glued together with the special secretions of the animal. The branchiæ or gills of the Sabella resemble those of the Serpula. It is found from Vineyard Haven to New Jersey.

MOLLUSKS.

201. Devil-fish. *Octopus vulgaris.*

Its body has the form of a round bag, its head is small with two large eyes, it has eight long tapering arms joined at their base by a web; each arm has two rows of sucking discs. The octopus uses its arms for climbing and crawling, and in catching and holding its prey. It feeds upon crabs and fishes. The aquarium has received several specimens from Bermuda, but they only live a few days in the tanks.

202. Common Squid. *Loligo pealii* (Le Sueur).

This species attains a length of twelve inches, its color is changeable. The Squid is used for bait, and it is an important factor in the food supply for many of our larger edible fishes. It is found from Massachusetts to South Carolina.

203. Oyster. *Ostrea virginiana* (Lister).

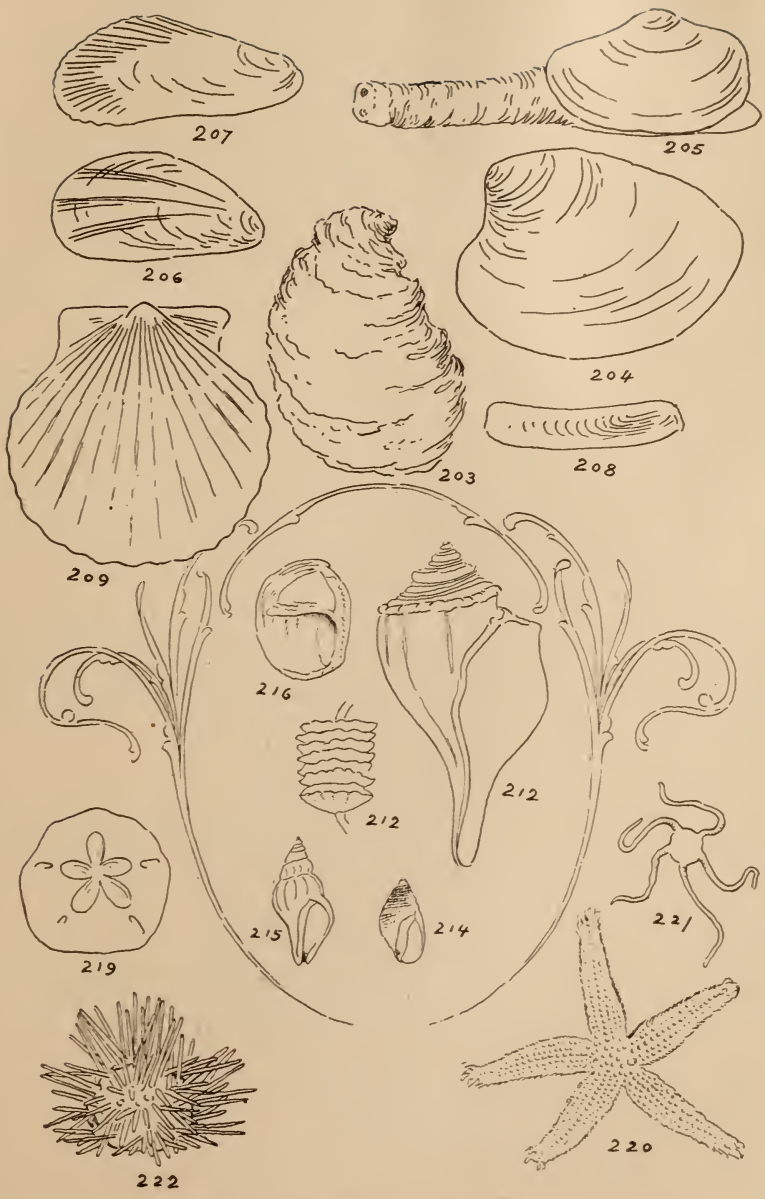
This species of Oyster is found from the Gulf of St. Lawrence to Tampa Bay. The Oyster grows rapidly in localities with a soft mud bottom, where there is an abundant supply of food. The Star-fish and Drill destroy many oysters.

204. Quahog ; Hard Shelled Clam. *Venus mercenaria* (Linne).

The Quahog is abundant from Cape Cod to Florida. As an article of food it ranks next to the Oyster in the United States, and it is also extensively used as bait. It is found on sandy and muddy flats, a short distance beyond low-water mark.

205. Soft-shelled Clam ; Long-Clam. *Mya arenaria* (Linne).

It buries itself beneath the sand and mud in permanent burrows; its long siphon-tubes can be extended a foot or more. On the coast of New England



MOLLUSKS.

large quantities of this species are salted to be used as bait in cod-fishing. It is found from Maine to South Carolina.

206. Edible Mussel. *Mytilus edulis* (Linné).

It is found in great numbers on rocky shores, from the Arctic Ocean to North Carolina. It attaches itself by byssus threads to timbers and rocks. In New York large quantities of this mussel are pickled to be used as food.

207. Horse Mussel. *Modiola modiolus* (Turton).

This Mussel lives in crevices between the rocks at extreme low-water, partly buried in the gravel and firmly attached. Like the Edible Mussel it is devoured by several species of fishes. It is found from Greenland to New Jersey.

208. Razor-Shell. *Ensatella americana* (Verrill).

The shell is long, narrow and slightly curved, and is quite smooth. It is found on sandy bottoms, from Labrador to Florida. It burrows in the sand from two to three feet.

209. Scallop. *Pecten irradians* (Lamarck).

The shells vary in color, they are dark, with yellow, reddish, and light bands or mottlings. The large muscle which it uses to open and close its shell, is the portion used for food. It is found in sheltered places, from Cape Cod to Florida, and on the northern shore of the Gulf of Mexico.

210. Ship-worm. *Teredo navalis* (Linné).

Though generally known as Ship-worm it is not a worm, but a true mollusk, and is related to the long-clam. The Teredo excavates or bores its hole or burrow in submerged wood for its protection. It does great damage to ships, piles and timbers of wharves. This species is abundant on the Atlantic coast of the United States, and coasts of Europe.

211. Winkle. *Sycotypus canaliculatus* (Gill).

This is one of the largest of the mollusks of the Atlantic coast north of the tropics. This species is easily recognized by a spiral groove running around the tops of the whorls. It does great damage to the oyster. It is found from Cape Cod to Florida, and on the northern coast of the Gulf of Mexico.

212. Pear-Conch. *Fulgur carica* (Conrad).

On the coast of New Jersey and southward it reaches a very large size. This species is recognized by the tubercles or projections on the angles of its whorls. The eggs of both the Winkle and the Pear-Conch are discharged in a series of disk-shaped yellowish capsules three-fourths to one inch in diameter, which are united on the edge by a stout flexible stem; there may be fifty or seventy-five capsules in a series, each one containing fifty or sixty eggs or embryo Winkles or Pear-Conchs. It is found from Cape Cod to Florida.

213. Natica. *Lunatia heros* (Adams).

This species is found from the Gulf of Saint Lawrence to Georgia. The shell is nearly round. When it moves the white soft parts are spread out till they nearly conceal the shell. The foot when extended is large and flat with thin edges, which enables the animal to burrow beneath the surface of the sand, which it does for protection or in search of food.

214. Nassa. *Illynassa obsoleta* (Stimpson).

This is found on flats and muddy bottoms in almost countless numbers from the Gulf of Saint Lawrence to Florida. It is a scavenger, and may be seen gliding along the sides or bottom of many of the tanks in the aquarium in search of food.

215. Drill. *Urosalpinx cinerea* (Stimpson).

The Drill feeds upon oysters and other bivalves by drilling a round hole in the shells with the sharp hard teeth that cover its tongue, then sucking out the contents. It is abundant in Long Island Sound and on the coast of the Middle States bordering on the Atlantic.

216. Boat-Shell. *Crepidula fornicator* (Lamarck).

This univalve adheres to both living and dead bivalve and other shells. The shell resembles a boat with a rounded bottom. the inside is half-covered by a flat partition. It is found from Massachusetts to Florida.

217. Jingle-Shell. *Anomia globra* (Verrill).

Its shell is very thin and delicate in appearance and of a beautiful golden or silver hue. It gives out a metallic sound when blown by the wind along a pebbly beach.

ASCIDIANS.

218. Sea-Squirt. *Molgula manhattensis* (Verrill).

It is found adhering to the underside of rocks, on piles, and sea weeds. Its form is rounded with two short tubes on the upper part of its body. The color is yellowish or light olive green. When it is pressed with the fingers the animal contracts and throws out of its tubes small jets of water, hence its name,

ECHINODERMS.

219. Sand Dollar. *Echinarachnius parma* (Gray).

The Sand-Dollar is from an inch and a half to three inches across. It moves slowly by means of numerous minute spines or bristles, which the animal can extend or contract. Its range is from Labrador to New Jersey.

220. Star-fish. *Asterias arenicola* (Stimpson).

The Star-fish has five flexible arms or rays; it is abundant on rocky and shelly bottoms; it feeds upon oysters and mussels. If the animal is torn apart and thrown into the water, each arm has the power of reproducing all parts, and in time it becomes a perfect Star-fish. It is found from Massachusetts to Florida.

221. Brittle Star-fish. *Ophiura olivacea* (Lyman).

It is found among rocks and eel grass, and sometimes on sandy shores. The arms of this Star-fish radiate from a well defined central disk; they are slender and somewhat stiff. It is found from Cape Cod to North Carolina.

222. Sea-urchin. *Arbacia punctulata* (Gray).

This species of Sea-urchin has rather stout and long purple spines; a part of the upper surface is nearly devoid of spines. It is found in Long Island Sound, and Vineyard Sound to the Gulf of Mexico.

POLYPS

223. Fringed Sea-Anemone. *Metridium marginatum* (Milne-Edwards).

When fully distended the form of this Anemone is very graceful. Its tentacles are fine and delicate, and cover the upper disk nearly half the distance to the mouth. The colors are varied, including many shades of brown with mottlings of white, orange, salmon and flesh color. This species is found from Labrador to New Jersey.

224. White-armed Anemone. *Sagartia leucolena* (Verrill).

The colors are white, light gray and flesh color. The body is rarely more than one half inch in diameter; it distends itself to three or four inches in length, and the tentacles to a length of one inch or more. It is found from Cape Cod to North Carolina.

225. Long-armed Anemone. *Actinia anguicorma* (West).

Its body is short and the diameter rarely more than three-fourths of an inch; the tentacles are very long and slender, The color is olive green with several yellow or brown stripes extending from the upper to the lower disk,

226. Stout-armed Anemone. *Tealia crassicornis.*

This is the largest species of anemones existing on this coast, specimens of various colors and mottlings are found on rocky bottoms in some localities on the south coast of Long Island. It is easily distinguished by its short and stout tentacles.

227. Bermuda Anemone. *Actinia mesembryanthemum.*

A very handsome species of various colors; some specimens have a dark red body with light red tentacles, others having an olive green body and salmon colored tentacles. It is abundant about the Bermuda Islands.

228. Northern Coral. *Astrangia danæ* (Agassiz).

This coral is found on rocky bottoms from Cape Cod to Florida, and in Long Island Sound on rocks, pebbles and shells. The polyp of this species can extend its body to a length of nearly an inch; it is generally whitish, the tentacles covered with minute warty prominences. It secretes the corallum at the base only.

BALANCED AQUARIA.

The illustration on page 45 represents a small balanced aquarium, with fresh water plants aud animals. To keep fish alive in an aquarium there must be a supply of oxygen. It is probable that a majority of the people who keep in the house a few gold fish in a globe or tank provide the fish with air by changing the water, but the air in the water is soon exhausted and the fish may suffer or die before the water is again changed. In a balanced jar or tank the water plants with the aid of light are constantly producing oxygen, thereby providing the animal life with air and also keeping the water pure; the animals give off carbonic acid gas, which the vegetation requires for its growth. It is well to use on the bottom of the aquarium fine gravel of sufficient depth to cover the roots of the plants and to hold them in place; to prevent the clusters of plants from floating, wind narrow strips of sheet lead loosely around the lower end of the stalks The best plan is to put the gravel, plants and water in the aquarium and place it near a window where it will get sufficient light, thus starting aera-

tion before putting in any animal life. Be sure to have plenty of plants; do not overstock with animals. All dead matter, both animal and vegetable, should be removed daily. Quite small fish will thrive best and will be less destructive to the plants. Newts, tadpoles and a few small snails, as for instance the Physæ and Planorbis, are interesting. The newt, a comic acrobat, is an amus-

ing little animal. The five-spined stickleback, *Eucalia inconstans*, is a very interesting little fish; it is one of the nest builders. Even if you do not meet with entire success at first, if you persist you will be well repaid, for a balanced aquarium is both beautiful and instructive.

31a. Green Moray. *Lycodontis funebris* (Ranzani).

This species of Moray is known to reach a length of twelve to fifteen feet and probably more; it is extremely ferocious and when caught fights viciously, biting anything within reach. The teeth are situated along the edge of the upper and lower jaws, also on the front of the vomer or roof of the mouth; the

teeth of the Moray are very sharp and incline backward toward the throat. Its breathing is peculiar, opening the mouth quite wide taking in a quantity of water which distends the throat and cheeks; as the mouth closes and the throat and cheeks are contracted the water is forced through the gill openings which are nearly round, flexible and small. The flesh of the Green Moray is said to be of excellent flavor and is highly esteemed by epicures. It is found in the tropical and subtropical waters of America on the Atlantic and Pacific coasts.

The Green Moray is quite plentiful about rocks and coral reefs.

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